This document contains Appendix E from the 2004 Holland America Oosterdam Data report. Appendix E contains Sampling and Analysis Plan for the Oosterdam, September 14 through September 24, 2004. The report and all the appendices for this sampling event can be downloaded from ***http://www.epa.gov/owow/oceans/cruise_ships/oosterdam.html***

Holland America Oosterdam

2004 Analytical Results

Appendix E

March 2006

Appendix E

SAMPLING AND ANALYSIS PLAN FOR HOLLAND AMERICA OOSTERDAM SAMPLING EPISODE 6506

United States
Environmental Protection
Agency

Sampling and Analysis Plan for Holland America Oosterdam

Sampling Episode 6506
September 11-25, 2004

U.S. Environmental Protection Agency

Oceans and Coastal Protection Division
Office of Wetlands, Oceans, and Watersheds

Engineering and Analysis Division
Office of Science and Technology

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1.0 INTRODUCTION

This plan describes the on-board sampling and analysis activities to characterize graywater and blackwater generated and discharged by the cruise vessel Oosterdam while in Alaska waters. This sampling program is being performed under the supervision of the Engineering and Analysis Division (EAD) and the Office of Wetlands, Oceans, and Watersheds (OWOW) of the U.S. Environmental Protection Agency (EPA). The sampling effort on board the Oosterdam will be performed by personnel from EPA and their technical contractor.

This document presents information on the planned sampling episode. This document, in combination with the generic health and safety plan, is intended to serve as a guide to the field sampling crew, a review mechanism for EPA personnel, and a source of procedural information for vessel personnel. Personnel EPA and supporting contractor performed an engineering ship visit to the Oosterdam on March 28, 2004. This sampling plan was prepared based on the results from that ship visit and from subsequent follow-up communication with Holland America Line personnel. Tables and figures are presented at the end of each section.

1.1 Background

The EPA is currently conducting a data collection effort aimed at ultimately developing new wastewater discharge regulations for large cruise vessels (greater than 500 passengers) that discharge treated sewage (blackwater) or graywater in the waters of the Alexander Archipelago or the navigable waters of the United States within the State of Alaska or within the Kachemak Bay National Estuarine Research Reserve (hereafter referred to as Alaska waters). Such regulations are authorized by “Title XIV - Certain Alaskan Cruise Ship Operations” of the Miscellaneous Appropriations Bill (H.R. 5666) passed by Congress on December 21, 2000 in the Consolidated Appropriations Act of 2001 (Pub. L. 106-554)(Sections 1401 - 1414), also known as the Murkowski Bill. The law defines sewage to mean human body wastes and wastes from toilets and other receptacles intended to receive or retain body waste. Graywater means only galley, dishwasher, bath, and laundry wastewater; the term does not include other wastes or waste streams. Graywater and blackwater discharges to Alaska waters are also regulated by State law (AS 46-03.460 - 46.03.490).

The sampling program on board the Oosterdam and the subsequent pollutant analyses, data analyses, and trip report preparation will focus on graywater and blackwater origins, intermediate stages of treatment, final treated effluent, and final discharges. EPA will use these data in evaluating pollutants in graywater and blackwater generated on board the Oosterdam, and determine the capability of the Oosterdam's wastewater treatment system to remove pollutants prior to discharge.

Graywater and flow characterization data are also important focuses of the Oosterdam's sampling program, as available graywater and flow characterization data are very limited. Sample collection will be established to provide information regarding pollutant concentrations and loadings for individual graywater sources (e.g., galley, laundry) and will provide information to develop time-phased "flow profiles" for the sampled waste streams to analyze patterns and variability in graywater and blackwater flows both throughout the day (e.g., day versus night, mealtimes) and between days (e.g., while underway, in port).

1.2 Ship Selection

EPA selected the Oosterdam in order to characterize the performance of the ROCHEM wastewater treatment system. This system is one of several that received certification for continuous discharge in Alaska by the U.S. Coast Guard in 2003. EPA based the decision to sample the Oosterdam on sampling logistics (i.e., the ship that is most easily accessible, is available at a convenient time, etc.). EPA will sample the Oosterdam to collect information regarding the system design and day-to-day operation and maintenance, and will focus sampling not only on the treated effluent, but also include samples of the influent to wastewater treatment, effluent from individual treatment units, and treatment residues.

2.0 SHIP OVERVIEW

The Oosterdam is a 85,000 gross ton cruise vessel, capable of carrying 1,848 passengers and 800 crew. The vessel has a length of 951 feet, a beam of 105.8 feet, and was built with 11 decks to accommodate the passengers and crew. There are a number of dining areas, bars, and cafes located throughout the vessel, plus a casino and gift shops. The Oosterdam has a spa and gymnasium that includes a fitness center, juice bar, massage, treatment rooms and a beauty salon. Other amenities include photo labs for developing pictures and a medical center where passengers can seek medical assistance.

The remainder of Section 2 is a discussion of the Oosterdam's wastewater sources, collection, holding, and transfer system, and the wastewater treatment system. The complete ship visit report is located in the administrative record for this project.

2.1 Graywater and Blackwater Generation, Collection, Holding, and Transfer

The Oosterdam generates graywater and blackwater that enter the graywater and blackwater/graywater treatment systems, including:

- Graywater from the galley;
- Graywater from accommodations;
- Graywater from laundry;
- Blackwater from toilets, urinals, and other human waste receptacles;
- Bar wastewater; and
- Salon wastewater.

Figure 2-1 shows the planned graywater source characterization sampling points.

All graywater and blackwater systems use potable water. The ship conducts in-line chlorination as water is bunkered. Chlorine is added during water distribution, providing a chlorine concentration of 0.2 ppm at the furthest point in the distribution line.

The graywater from accommodations is generated from tubs, showers, and sinks in the passenger and crew rooms. In addition, wastewater from bar sinks and salons are also routed through the accommodations graywater stream. The Oosterdam does not contain passenger laundrettes; therefore, this graywater source is not applicable. Accommodations graywater flows to accommodations holding tanks, where it is pumped to the graywater main lines and the graywater treatment system. Accommodations account for a large percentage of the graywater generated by the vessel (approximately 460 m^3/day), however, the amount and rate of accommodations graywater is highly variable as it is largely dependent upon passenger activities such as showering.

Laundry wastewater (approximately 40 m^3/day) is collected in a holding tank that has a 12 hour holding capacity. The holding tank acts as a buffer to keep flow from the laundry facilities to the graywater treatment system relatively constant. Two pumps route laundry graywater from the holding tank to the graywater main line.

Galley wastewater consists of wastestreams from dishwashing, galley deck drains, floor washing (typically hand mops), and galley sinks. Galley wastewater is sent through grease traps and routed to the blackwater/graywater treatment system.

Blackwater is generated from toilets, urinals, and other human waste receptacles. These waste streams are collected into five blackwater evacuation tanks. An anti-foam chemical is added to the evacuation tanks. The blackwater is then routed to the blackwater/graywater treatment system.

Food waste is not treated by the graywater or blackwater/graywater systems. Two food systems are operated onboard the Oosterdam to grind and dewater food waste. The first system (A), dewaters food waste using a vacuum dryer, while the second system (B) uses a centrifuge (also referred to as a decanter). Food pulper wastewater generated by the vacuum drain and the centrifuge (a total of 8 to 10 m^3/day) are sent to a ballast tank (the same ballast tank is used for wastewater treatment solids) for discharge overboard outside of 12 nautical miles (nm). Dried food solids are incinerated on board. The food pulper wastewater is acidic (pH 4 to 5).

Photo lab waste is considered hazardous waste and is not routed through the treatment system, but is held for onshore disposal. The Oosterdam has a silver recovery unit on board to treat waste from the photo labs and the infirmary x-ray.

Pools and jacuzzis are regulated by the CDC's Vessel Sanitation Program and use bromine for disinfection. The Oosterdam avoids routing pool wastewater through the graywater or blackwater/graywater treatment streams because the bromine could potentially have a negative impact on operation. As a result, pool water is discharged directly overboard when necessary. The Oosterdam also has an emergency dump for its pools should the ship loose stability.

2.2 Graywater and Blackwater Treatment Systems

The Oosterdam treats graywater and blackwater separately. Laundry and accommodations graywater are routed to the graywater treatment system via the collection, holding, and transfer (CHT) system. Passenger and crew galley wastewater, blackwater and membrane concentrate from the graywater treatment system are collected and transferred via the CHT system to the blackwater/graywater treatment system. The Oosterdam operates an advanced graywater treatment system and a blackwater/graywater treatment system, both designed and manufactured by ROCHEM UF - Systeme. The Oosterdam is the only Holland America Line vessel cruising to Alaska in 2004 equipped with both of these systems.

2.2.1 Graywater Treatment System

Figure 2-1 presents a simplified layout of the ROCHEM graywater treatment system onboard the Oosterdam. This system uses low pressure reverse osmosis (RO). Accommodations and laundry graywater enter graywater holding tanks and then is passed through a SWECO vibrating filter at a rate of approximately 500 m^3/day. One SWECO filter operates while the other is on standby. From the SWECO filter the wastewater enters bag filters used as pretreatment to protect the RO system. Antiscale chemicals are continuously added before the bag filter to keep the membranes clean. Next, the graywater enters the first stage RO membranes. The concentrate from the membranes is sent to the blackwater/graywater treatment system for further treatment. The graywater permeate bypasses the second stage RO membranes, which are not currently used and is collected in small permeate tanks. Sodium hydroxide is added to the permeate to control pH before it enters the ultraviolet disinfection unit. The final effluent is discharged continuously overboard, or is held in ballast tanks for discharge overboard outside 12 nm. A system modification in April 2004 replaced the existing UV unit with a larger unit and combined the effluent from the graywater and blackwater/graywater treatment systems into a common discharge. The effluent from the new UV unit is approximately 30 meters from the planned combined discharge.

The Oosterdam is able to vary the recovery rate of the reverse osmosis units. Currently, the reverse osmosis system is set to produce 85 percent permeate and 15 percent concentrate. The second stage RO membranes are not used because the first stage RO membranes achieve the desired effluent quality. The second stage membranes are operational and can be used in an emergency, such as significant maintenance or performance problems with the first stage membranes.

Solid wastes generated by the graywater treatment system include filter solids generated by the SWECO vibrating filters and spent bag filters from RO pretreatment. SWECO solids (approximately 20 gallons per day) are vacuum pumped from the solids collection tank and combined with sludge generated by the blackwater/graywater treatment system for storage in a ballast tank and discharge overboard outside of 12 nm. Four spent filter bags are generated each day and are incinerated on board.

The graywater system is cleaned every 80 hours, or when the pressure through the membranes exceeds 5 bars. The cleaning cycle is automated using a series of steps programmed into the control system. The membranes soak in a cleaning solution for 45 minutes and are then rinsed. Waste from the cleaning process is discharged to the graywater membrane concentrate stream which is conveyed to the blackwater/graywater system for further treatment. The system is in standby mode while in the cleaning sequence. Occasionally, the graywater treatment system undergoes a more aggressive chemical soak similar to that conducted for the blackwater/graywater treatment system.

2.2.2 Blackwater/Graywater Treatment System

Figure 2-2 presents a simplified layout of the ROCHEM blackwater/graywater system onboard the Oosterdam. This system's main components are biological treatment and low pressure reverse osmosis. Crew galley graywater and membrane concentrate from the graywater treatment system are combined in one buffer tank, and passenger galley graywater and blackwater are combined in another buffer tank. The wastewater is mixed between the buffer tanks using a recirculating pump. An antifoam chemical is added to the recirculation loop. From the buffer tanks the wastewater passes through the SWECO vibrating filters (one operating and one on standby), and the filtered wastewater collects in the filtrate tank, where sodium hydroxide is added to control pH. Next, wastewater enters the first stage of the bioreactor and continues through the second stage of the bioreactor. Blowers introduce air into the bioreactors. The wastewater is then pumped to the reverse osmosis membranes. The membrane permeate is collected in small permeate tanks. Finally, the wastewater passes through the ultraviolet disinfection unit. The final effluent is discharged continuously overboard or held in ballast tanks for discharge overboard outside 12 nm. The flow rate through the blackwater/graywater system is approximately 325 m^3/day. A system modification in April 2004 replaced the existing UV unit with a larger unit and combined the effluents from the graywater and blackwater/graywater treatment systems into a common discharge. The effluent from the new UV unit is approximately 45 to 50 meters from the planned combined discharge.

Solids are generated by the SWECO vibrating filters and the bioreactors. The solids from the SWECO vibrating filters, which are too wet to incinerate, are conveyed to a ballast tank for storage and discharge overboard outside of 12 nm. Waste biosludge is removed from the bioreactors to maintain a constant biomass concentration in the bioreactors. The typical wasted biosludge volume is 260 m^3 per day and is determined based on bioreactor wastewater

TSS levels. Waste biosludge is removed throughout the day and held in a ballast tank (with SWECO solids) for discharge overboard outside of 12 nm.

The reverse osmosis membranes in the blackwater/graywater treatment system are cleaned every 120 days. The cleaning cycle takes a full day. Two different chemicals are used during the cleaning process: alkaline for five hours and then acid for four to five hours. Cleaning fluids are combined with the SWECO solids and waste biosludge in the ballast tank for discharge overboard outside of 12 nm.

2.2.3 Treatment System Performance and Maintenance

The first ROCHEM systems for treatment of both graywater and blackwater were installed on Holland America Zuiderdam. Several ROCHEM system problems were corrected prior to system installation on the Oosterdam; however, there were still performance issues. For example, the original ROCHEM design did not include UV disinfection units; however, inconsistent performance resulted in variable fecal coliform counts in the treated effluent. The Oosterdam also has problems with RO membranes on the blackwater/graywater treatment system. The original design included use of two-thirds of the membranes at a time, with the remainder in standby or maintenance. The Oosterdam installed excess membrane capacity in April 2004. Finally, the ROCHEM system has a large number of mechanical parts (e.g., 147 pumps), resulting in long-term maintenance problems and expense. On the other hand, the system has a very modular design, which facilitates maintenance. Two operator personnel provide 24-hour operation of the two treatment systems and the food waste system.

The blackwater/graywater treatment system includes a RO membrane system for waste biosludge dewatering. This system was unable to increase the biosludge solids content to a level that would allow the sludge to be incinerated onboard. Therefore, the system is not used on the Oosterdam, and it has been completely redesigned for use on Holland America Westerdam. The Oosterdam will receive the revised biosludge dewatering system in October 2004.

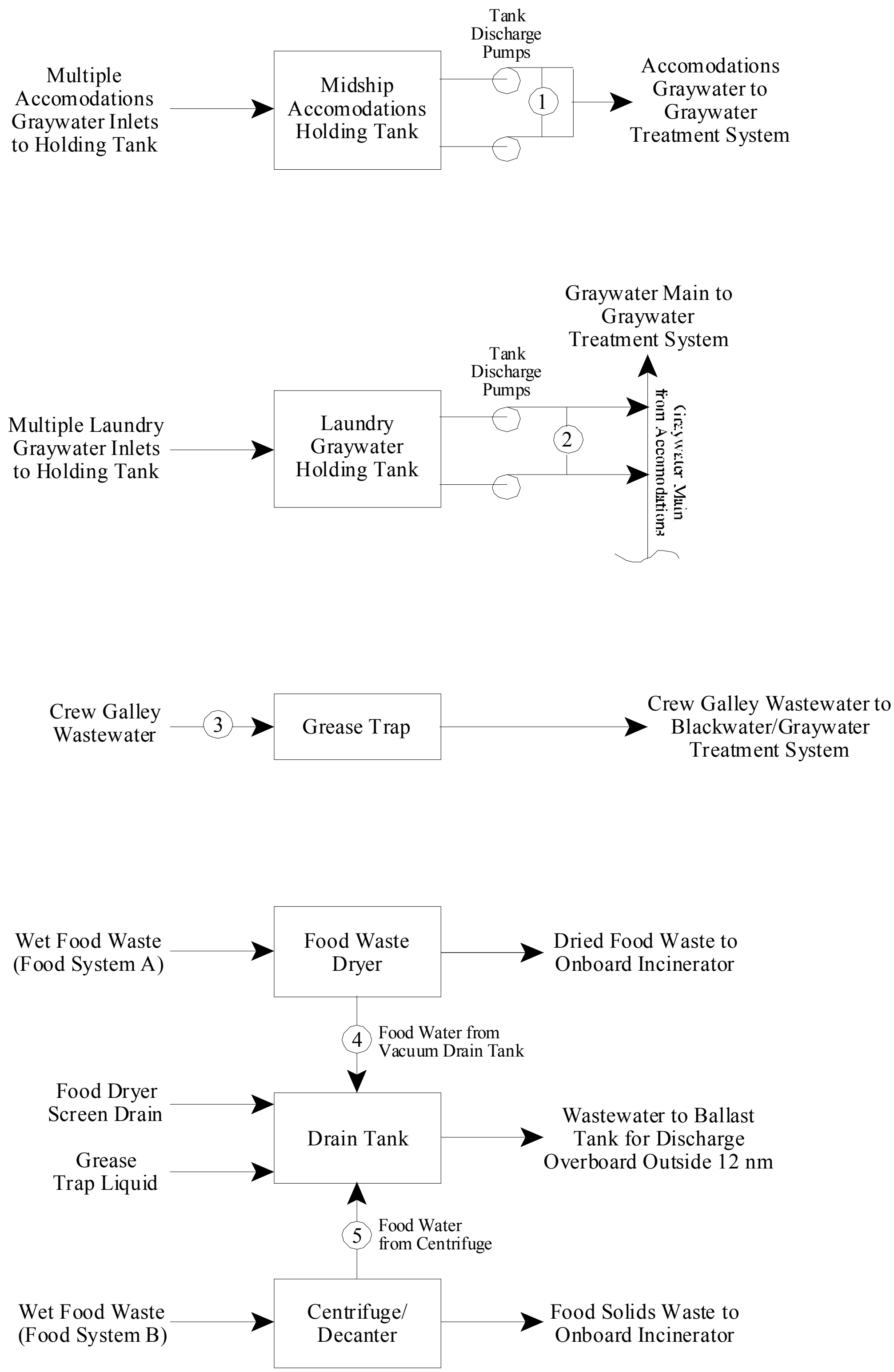

Figure 2-1. Graywater Sources Characterization - Holland America Oosterdam

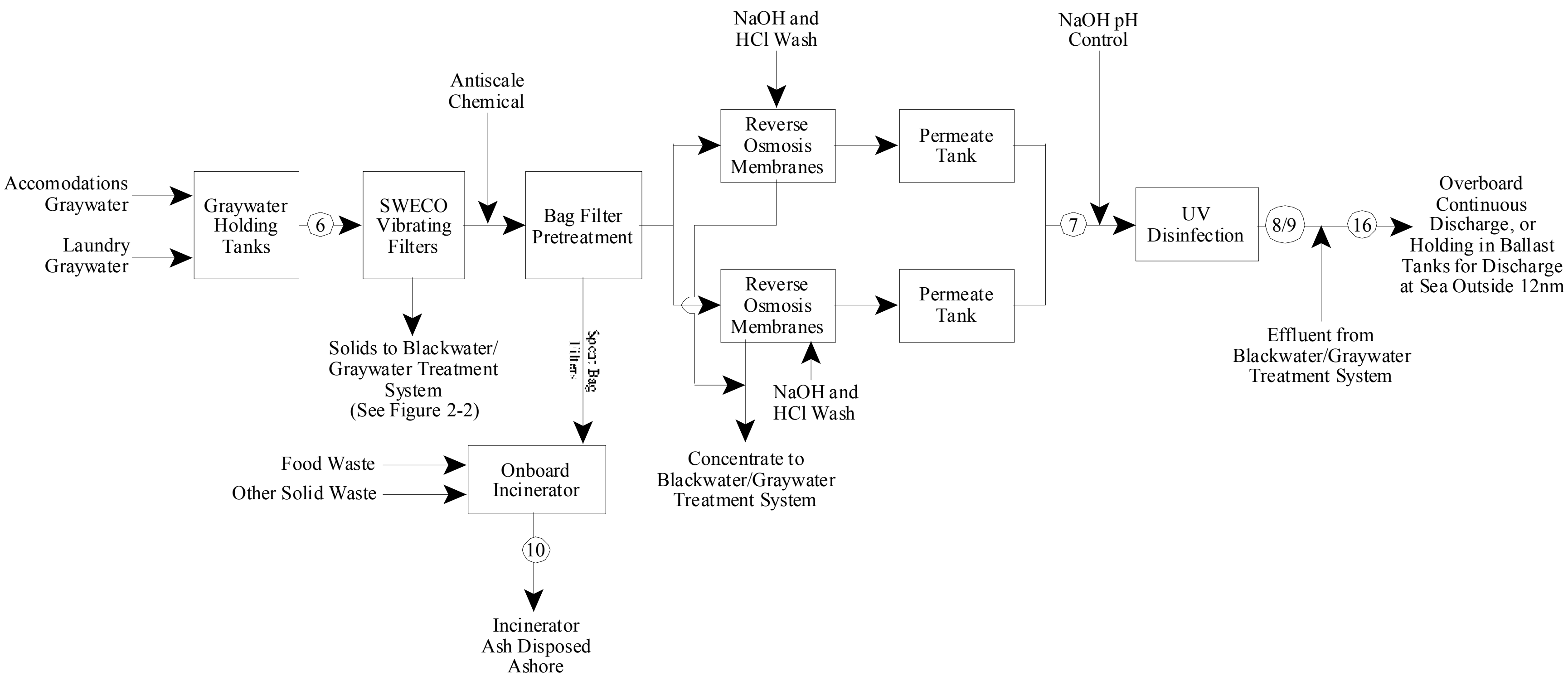

Figure 2-2. Graywater Treatment System - Holland America Oosterdam

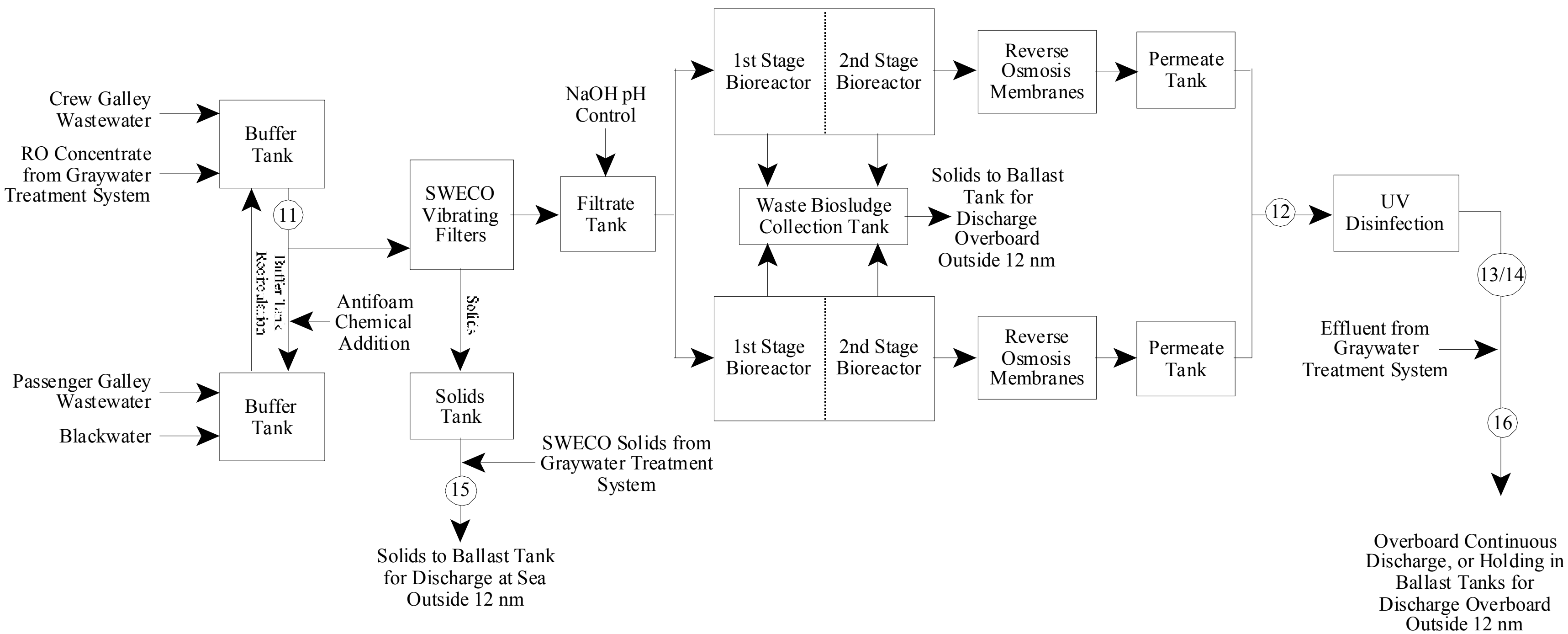

Figure 2-3. Blackwater/Graywater Treatment System - Holland America Oosterdam

3.0 SAMPLING APPROACH

This section contains detailed information regarding specific sampling points and locations, sampling methodologies, analytes, sampling frequency and duration, schedule, and logistics for sampling on board the Oosterdam.

3.1 Sampling Point Selection

Table 3-1 lists the proposed sampling points, the number of samples to be collected, and the parameters for analysis for this sampling episode. Table 3-2 lists the sample type, sample container, sample volume, and on-board preservation for each parameter or parameter group which may be analyzed. Table 3-3 presents the sampling locations, flow measurement techniques, and the sample collection type (grab or composite).

Figure 2-1 shows the planned graywater source characterization sampling points, while Figures 2-2 and 2-3 show the graywater and blackwater/graywater treatment system sampling points, respectively. A brief description of what each sampling point will characterize is presented below:

- SP-1 Accommodations wastewater characterization;
- SP-2 Laundry wastewater characterization;
- SP-3 Galley wastewater characterization;
- SP-4 Food pulper wastewater characterization, vacuum tank;
- SP-5 Food pulper wastewater characterization, centrifuge;
- SP-6 Influent to graywater wastewater treatment;
- SP-7 Influent to graywater treatment system UV disinfection;
- SP-8 Effluent from graywater treatment system;
- SP-9 Effluent from graywater treatment system duplicate;

- SP-10 Incinerator ash;
- SP-11 Influent to blackwater/graywater treatment system;
- SP-12 Influent to blackwater/graywater treatment system UV disinfection;
- SP-13 Effluent from blackwater/graywater treatment system;
- SP-14 Effluent from blackwater/graywater treatment system duplicate;
- SP-15 Combined graywater and blackwater/graywater treatment system waste sludge;
- SP-16 Final combined discharge from graywater and blackwater/graywater treatment systems;
- SP-17 Source water;
- SP-18 Trip blank; and
- SP-19 Equipment blank.

3.2 Analyte Selection

Analytes included in the sampling program for the Oosterdam include those in the classes of pollutants listed below.

- Fecal coliforms;
- Escherichia coli (E. coli);
- Enterococci;
- Biochemical oxygen demand, 5-day (BOD_5);
- Chemical oxygen demand (COD);
- Total organic carbon (TOC);
- Total suspended solids (TSS);
- Settleable solids (SS);
- Total dissolved solids (TDS);
- Total Kjeldahl nitrogen (TKN);
- Ammonia as nitrogen;
- Nitrate/nitrite as nitrogen;
- Total phosphorus;
- Sulfate;

- Chloride;
- Alkalinity;
- Hexane extractable material (HEM);
- Silica-Gel Treated Hexane Extractable Material (SGT-HEM);
- Volatile organics;
- Semivolatile organics;
- Metals (total and dissolved);
- Hardness (calculated from metals data);
- Cyanide (total and available);
- Organo-phosphorous pesticides;
- Organo-halide pesticides;
- Chlorinated biphenyls congeners (PCBs); and
- Dioxins and furans.

Table 3-4 lists analyte and pollutant parameters along with their analytical method numbers and laboratory measurement techniques. Not all analytes and pollutant parameters will be analyzed for at all sampling points. Appendix A of this document lists the individual parameters included in each analytical method. In addition to these analytes, the sampling crew will conduct field measurements at all sampling points, as identified in Table 3-5.

Certain conventional and non-conventional pollutants (Group I and Group II) will be collected in the same sample bottle at some sampling points. "Group I" parameters include TDS, TSS, chloride, sulfate, and alkalinity. "Group II" parameters include TOC, COD, ammonia as nitrogen, nitrate/nitrite as nitrogen, TKN, and total phosphorus. HEM and SGT-HEM will also be collected in the same sample bottle at each sampling point. All other parameters will be collected in individual bottles.

Due to the very short sample holding times for microbiologicals (fecal coliforms, E. coli, and enterococci - 6 hours), BOD_5 (48 hours), and SS (48 hours), an on-board laboratory will be used for analysis of these samples where necessary.

3.3 Sample Collection

Much of the information about the collection of samples for this sampling program is summarized in a series of tables as follows:

- Table 3-1, summarizes the sampling points and analytes to be studied;
- Table 3-2, summarizes the parameters, bottle types, sample volume, and preservation requirements; and
- Table 3-3, sampling locations, flow measurement techniques, and the sample collection type

To characterize the waste streams on board the Oosterdam, the samplers will employ varying methods of sample collection depending on the sampling point, pollutant parameters, and the nature of the sample flow and composition at each sampling point. The following subsections provides a detailed description of the sample collection techniques.

Samplers will work in teams of two to ensure that proper sampling techniques are followed and adequate notes are taken at each sampling location. Samplers will wear disposable gloves, tyvek suit, and safety eyewear, and will observe precautions while collecting samples, remaining aware of the potential biohazards present.

Sample containers and bottles will be purchased pre-cleaned and certified and will not require rinsing with sample. Samplers will take care not to touch the insides of bottles or lids/caps during sampling. All samples collected during the sampling episode will be cooled immediately in an ice-water bath to 4°C and then placed into coolers containing bagged ice (or chemical ice) to maintain a sample temperature of 4°C throughout sample storage, shipment (or transfer for on-board analysis), and receipt at the analytical laboratories.

3.3.1 Flow Measurement Approach

Flow measurement data will be collected to support both the treatment system/ final effluent discharge and the graywater characterization sampling efforts. The availability of existing equipment on board the Oosterdam, accessibility of piping and tankage, and the capability of removing liquids from transfer lines will determine how flows are measured. Preferred flow measurement techniques, based on the ship visit to the Oosterdam are listed in Table 3-3, along with contingencies for obtaining flow data.

For those sampling points with existing flow totalizers, flow data will be recorded on the data sheet provided in Figure 3-2 at a minimum frequency of every six hours. If totalizer data is not available, then a series of instantaneous flow rates will be measured and recorded using an ultrasonic flow meter installed by the samplers. The flow measurements will provide the amount of wastewater processed in periods corresponding to analytical data collected. In the event that neither flow totalizer data nor reliable flow measurement can be made for a specific sampling point, flow rates will be estimated using tank level indicator readings or pump capacities and operating times.

Flow-weighted composite samples will be collected, if possible, from the accommodations graywater (SP-1), laundry graywater (SP-2), galley graywater (SP-3), food pulper graywater (SP-4 and SP-5), graywater treatment system influent (SP-6), and graywater treatment system effluent (SP-8/SP-9), blackwater/graywater treatment system influent (SP-11), blackwater/graywater treatment system effluent (SP-13/SP-14), and combined discharge from the graywater and blackwater/graywater treatment systems (SP-16) using automatic sampling machines. Flow meters will signal the automatic sampling machines to collect a sample each time a fixed quantity of water has passed through the wastewater piping.

3.3.2 Graywater Characterization Samples

Graywater characterization samples that will be collected include accommodations (SP-1), laundry (SP-2), galley (SP-3), and food pulper (SP-4 and SP-5). Note that graywater characterization samples will only be collected for one 24-hour period as compared to five 24-hour sampling periods for wastewater treatment samples. None of these sampling points have existing flow meters. In general, graywater characterization samples are analyzed for all pollutant parameters. Exceptions include microbiologicals because of the capacity limitations of the onboard laboratory; pesticides, which are analyzed for in only galley wastewater characterization samples to characterize possible pesticide sources in food preparation and pest management; and dioxins and furans, which are analyzed for in only laundry wastewater characterization samples to characterize possible generation of dioxins and furans by bleaching operations. PCBs will not be analyzed in any graywater samples.

In the case of SP-1, SP-2, and SP-3 sampling crew will install strap-on flow meters on the influent or effluent piping from each of the sampling points as described in Table 3-3. The flow meters will signal the automatic sampling machines to collect samples each time fixed quantities of wastewater have passed through wastewater piping. If the piping is not appropriate for the installation of a strap-on flow meter at any of these sampling locations (e.g., proximity to pumps and other sources of turbulence, gravity-flow piping, or pipe less than 50% full when flowing), the sampling crew will instead collected a time-weighted composite sample at those sample locations. At SP-4, wastewater is periodically pumped from the vacuum tank to the ballast tank. Therefore, at this sampling point, the sampling crew will prepare a manual composite sample using equal volumes of wastewater pumped from the vacuum tank during a 24-hour sampling period. At SP-5, wastewater is routed to the ballast tank approximately once every other day. At this sampling point, the sampling crew will collect a single grab sample as wastewater is discharged to the ballast tank.

During each 24-hour sampling period, a composite sample of up to 20-liters will be collected in 10-L glass composite sample containers from each graywater sampling point (except SP-5) to provide the required sample volume listed in Table 3-2, plus additional volume for laboratory quality control (see Section 3.4.6) and sample spillage. Composite sample containers will be maintained on ice throughout the 24-hour collection period. At the conclusion of each 24-hour sampling period, sample fractions will be poured from the composite sample containers into individual sample bottles using the procedure described in Section 5.1. Bottles will normally be filled to the shoulder of the bottle, leaving a small space for expansion and mixing. Filtering of samples for analysis of dissolved metals will be performed immediately upon receipt at the sampling staging area.

Up to four grab samples for HEM/SGT-HEM, VOCs, and total and available cyanide will be collected during each 24-hour sampling period (except SP-5). An equal number of graywater grab samples will be collected during peak and off-peak generation periods, with sample times determined based on an analysis of collected flow data. Each grab sample for microbiologicals will be analyzed separately at the on-board analytical laboratory. The HEM/SGT-HEM and total and available cyanide samples will be composited on board for a single analysis per sampling point per day, while VOC grab samples will be composited at the laboratory for one analysis per sampling point per day.

Grab samples will be collected directly into sample fraction bottles when possible. When not possible (e.g., the pump cycle on a graywater collection tank is too quick to allow for collection of all grab samples), VOC samples will be collected into a specially-cleaned 1-L widemouth jar; the 40-ml VOC vials will be subsequently filled with sample from the widemouth jar. All VOC vials will be filled leaving a convex meniscus at the top of the bottle, with no air bubbles present; when the VOC lid is screwed on a small volume of water will be displaced and no air should be present in the bottle. All VOC vials will be pre-preserved with two drops of HCl per vial for biological activity. If field measurements (see Section 3.6) indicate free chlorine is present in the graywater samples at concentrations greater than 0.03 mg/L, then 7 drops (3 granules solid form) of sodium thiosulfate will be added to the sample vials prior to sample collection.

Graywater generation information will be recorded on the graywater generation data sheet provided in Figure 3-2. Information regarding the generation and disposition of waste streams from the photo labs, print shop, dry cleaning, chemical storage, and medical areas will be recorded on the data sheet provided in Figure 3-3. In addition, information regarding the use of pesticides, fungicides, and rodenticides and their potential to enter graywater and blackwater systems will be recorded on the data sheet provided in Figure 3-4. Finally, information regarding the graywater collection, holding, and transfer system will be recorded on the data sheet provided in Figure 3-5.

3.3.3 Graywater and Blackwater Treatment and Final Effluent Samples

Influent to wastewater treatment (SP-6 and SP-11), influent to UV disinfection (SP-7 and SP-12), effluent from wastewater treatment (SP-8/SP-9 and SP-13/SP-14), and final combined discharge (SP-16) samples will be collected from the wastewater treatment systems on board the Oosterdam. Wastewater treatment influent samples will be analyzed for all pollutant groups except dioxins and furans. Samples collected at the influent to UV disinfection will be analyzed only for microbiologicals. Wastewater treatment effluent samples and final combined discharge samples will be analyzed for all pollutants except pesticides, dioxins and furans, and PCBs.

Sampling crew will install strap-on flow meters at SP-6, SP-8/SP-9, SP-13/SP-14, and SP- 16 to signal automatic sampling machines to collect samples each time fixed quantities of wastewater have passed through sampling point piping. Sampling points SP-7 and SP-12 do not require flow measurement since the three microbiological samples collected at these sampling point per 24-hour sampling period are grab samples.

During each 24-hour sampling period, a composite sample and up to three grab samples will be collected at each of the SP-6, SP-8/SP-9, SP-13/SP-14, and SP-16 sampling points using the same procedure as described for graywater samples in Section 3.3.2.

Information regarding the design, operation, and maintenance of the wastewater treatment units will be recorded on the data sheet provided in Figure 3-6. In addition, information regarding the blackwater collection, holding, and transfer system will be recorded on the data sheet provided in Figure 3-5.

3.3.4 Treatment Residue Samples

Samples of the incinerator ash (SP-10) and combined graywater and blackwater/graywater treatment system waste sludge (SP-15) will be collected as one time grab samples during the sampling episode. Incinerator ash samples will be collected from the incinerator ash storage hopper. Combined graywater and blackwater/graywater treatment system waste sludge will be collected from the influent piping to the ballast holding tank used to store this waste prior to discharge at sea outside 12 nm. Waste treatment sludge samples will be analyzed for volatile organics, semivolatile organics, total metals, cyanide, Group I, and Group II. Ash samples will be analyzed for semivolatile organics, total metals, and dioxins and furans only.

3.3.5 Source Water Sample

A source water grab sample will be collected from the ship's potable water system (SP-17) to determine if any of the targeted pollutants are present as background contamination. The source water sample will be analyzed for all of the target parameters, except for HEM/SGT-HEM, pesticides, dioxins and furans, and PCBs.

Information regarding the potable water source and treatment will be recorded on the data sheet provided in Figure 3-7.

3.3.6 Quality Assessment Samples

Duplicate samples are collected as part of the quality assurance program for this sampling episode. Duplicate samples are collected as separate aliquots in the field. One field duplicate per every 10 samples will be collected from sampling point SP-7 and analyzed for all pollutant parameters with the exception of HEM/SGT HEM, pesticides, dioxins and furans, and PCBs. Microbiological duplicate samples will also be collected from SP-7, but at a lesser frequency of one duplicate per 20 samples. (Duplicate samples for dioxins and furans and pesticides were collected on board another cruise vessel to satisfy program QC requirements.) Results of the duplicate analyses will be used to evaluate precision, including variability in sample collection, handling, preparation, and analysis.

One trip blank (SP-18) will be collected and analyzed for volatile organics. The sample will consist of high-performance liquid chromatography (HPLC) water poured into sampling bottles prior to the sampling episode, and shipped to the sampling location. The trip blank will be shipped back (unopened) to the laboratory along with collected samples. This blank will be used to evaluate possible contamination during shipment and handling of samples.

An automatic sampler equipment blank (SP-19) will be collected and analyzed for semivolatile organics, total metals, and dissolved metals. The equipment blank will consist of HPLC water pumped through a sampler, tubing, and into a composite jar from which a fraction will be poured off. Equipment blanks are used to evaluate possible contamination caused by sampling equipment or by sampling equipment decontamination procedures.

As part of standard laboratory quality control (QC), matrix effects on analytical performance are assessed through the analysis of matrix spikes and laboratory duplicates. The matrix effects will be assessed on the effluent from the wastewater treatment systems (SP-9 and SP-14) for all parameters except pesticides, dioxins and furans, and PCBs, and certain classical wet chemistry parameters. (The matrix effects for pesticides were assessed on board another cruise vessel to satisfy program QC requirements. Matrix effects assessment QC samples are not required for isotope dilution procedures (i.e., dioxins and furans by Method 1613 and chlorinated biphenyls congeners by Method 1668) and are not applicable for certain classical wet chemistry parameters.) Matrix effects assessment analyses are conducted on 10 percent of the samples from a given matrix within a sampling event. Consequently, additional sample volume must be collected for these QC analyses. The sampling team will be responsible for collecting, labeling, and shipping the laboratory QC volumes. Laboratory QC volumes will be collected as part of the composite volume and poured into separate sample bottles at the same time as other sample aliquots are prepared.

Laboratory duplicates will be collected as QC samples specifically for microbiologicals and will be collected as a single sample that is split and analyzed as two separate samples. Laboratory duplicates will be collected at a frequency of one per 20 samples of effluent from the wastewater treatment systems (SP-9 and SP-14). Several other microbiological QC procedures will be required prior to sampling, such as positive and negative controls, dilution water blanks, and media and sample bottle sterility checks. The procedures and frequencies for these analyses are outlined in the *Quality Assurance Project Plan for Rulemaking for Large Cruise Ships in Alaska Waters* (1).

3.4 Preservation, Shipping, and Analysis

All samples will be maintained on ice immediately upon collection. Chemical preservatives will be added on board according to method-specified protocols either upon sample collection (i.e., grab samples) or following preparation of sample fractions from the composite sample (see Section 5.1). Table 3-2 lists the analytical fraction type, sample container, sample volume, and preservation method for each type of analysis. Preservation may need to be repeated as chemical reactions progress in samples. The type and amount of preservation used will be recorded on sample preservation log sheets (Figure 3-7). The samples will be packed in ice chests with a sufficient quantity of wet ice to maintain a temperature of 4°C (+/- 2°C) until the Oosterdam arrives in port. Exceptions include metals samples which have no temperature requirements.

When the Oosterdam docks in Juneau, Sitka, and Ketchikan, Alaska, samples (except BOD_5 samples) will be prepared for overnight shipment via Federal Express to the laboratories. In the case of BOD5 samples, samples will be delivered to a contractor's Juneau laboratory by hand when docked in Juneau, Alaska, and will be shipped by Alaska Goldsteak to a contractor's Juneau laboratory when docked in Sitka and Ketchikan, Alaska. All samples being shipped via Federal Express will be packed in ice chests containing either chemical ice or double-bagged wet ice. All samples shipped via Alaska Goldstreak will be packed in ice chests containing chemical ice.

3.5 Field Measurements

Temperature, pH, salinity, conductivity, turbidity, sulfide, and free and total chlorine will be measured and recorded by the sampling crew at each sampling point when each grab sample is collected. A 1-liter glass jar will be filled during collection of each grab sample set for field measurements. Temperature and pH will be measured immediately after the collection of the field measurement aliquot; the other field measurements will be conducted shortly thereafter, either in the field or in the sample staging area. Samplers will follow applicable test kit calibration procedures specified by the manufacturer. Table 3-5 summarizes the field measurements, how they are to be taken, and the measurement frequency. Test meters instructions and calibration requirements for conductivity, salinity, sulfide, and free and total chlorine field measurements can be found in Appendix B.

Field sampling log sheets (Figure 3-9) will be completed at each sampling point for each 24-hour sampling period. This sheet will record the sampling methodology, names of the samplers, sample collection times, field measurements, and any notes and observations.

3.6 Sample Labeling

Each sample will be coded with a unique sample number and labeled at the time of collection. The self-adhesive label will be completed in indelible ink and will contain the following information:

- Sample number;
- Sampling episode number;
- Sampling point description;
- Sampling point and day;
- Analysis to be performed;
- Sample bottle type;
- Date of sample collection; and
- Preservation used.

Once applied to the sample container, labels will be covered with clear tape to prevent tampering, abrasion, smearing, or loss during transit.

3.7 Chain-of-Custody Record

To maintain a record of sample collection, shipment, and receipt by the laboratory, a Traffic Report will be filled out for each sample fraction at each sampling location. These forms will be completed and used to document sample custody transfer from the field to the laboratory, regardless of whether the analyses are completed on board or shipped to a designated laboratory. At the time of sample shipment, a copy of the traffic report will be sent to Sampled Control Center, another copy will be kept by sampling personnel, and the remainder of the copies will be transmitted with the samples to the analytical laboratories. Figure 3-10 includes a Traffic Report. When the samples are received by the designated analytical laboratory, a copy of the traffic report will be sent to Sampled Control Center to acknowledge receipt and the condition of the samples.

3.8 Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures applicable to the Oosterdam sampling episode are outlined in the *Quality Assurance Project Plan for Rulemaking Support for Large Cruise Ships in Alaska Waters* (1). The QA/QC program for sample collection on board large cruise vessels will include the following:

- Documentation of sample custody using Traffic Reports;
- Collection of field duplicate samples;
- Collection of trip blank(s) for VOC analyses;
- Collection of equipment blank(s) for semivolatile organics and total and dissolved metals analyses;
- Collection of laboratory duplicate samples for microbiologicals; and
- Analysis of positive and negative controls, dilution water blanks, and sample bottle and media sterility checks for microbiologicals prior to use in sampling.

3.9 Sample Splitting

The Oosterdam has the option to collect duplicate samples (split samples) at each of the sampling points. If this option is exercised, the owner of the Oosterdam or their representative will supply all of the personnel, equipment, glassware, and reagents required to collect the split samples and to coordinate the analysis of samples. Holland America Line representatives have not indicated a desire to collect split samples.

Table 3-1

Samples for Collection On Board Holland America Oosterdam

Sampling Point Number	Sampling Point Name	Micros	Vol	Semivol	Total Metals	Dissolved Metals (a)	Cyanide (b)	HEM/ SGT-HEM	BOD	Solids	Group I	Group II	Pest (c)	D/F	PCB
SP-1	Accommodations Wastewater Characterization		1	1	1	1	1	1	1	1	1	1			
SP-2	Laundry Wastewater Characterization		1	1	1	1	1	1	1	1	1	1		1	
SP-3	Galley Wastewater Characterization		1	1	1	1	1	1	1	1	1	1	1		
SP-4	Food Pulper Wastewater Characterization, Vacuum Tank		1	1	1	1	1	1	1	1	1	1			
SP-5	Food Pulper Wastewater Characterization, Centrifuge		1	1	1	1	1	1	1	1	1	1			
SP-6	Influent to Graywater Treatment System	10 (d)	5	5	5	5	5	5	5	5	5	5			
SP-7	Influent to Graywater Treatment System UV Disinfection	15 (e)													
SP-8	Effluent from Graywater Treatment System	15 (e)	5	5	5	5	5	5+4QC	5	5	5	5			
SP-9	Effluent from Graywater Treatment System (Duplicate)	2+2QC	1+2QC	2+4QC	1+2QC	1+2QC	2+4QC		2	1	1+2QC	2+4QC			
SP-10	Incinerator Ash			1	1									1	
SP-11	Influent to Blackwater/Graywater Treatment System	10 (d)	5	5	5	5	5	5	5	5	5	5	1		1
SP-12	Influent to Blackwater/Graywater Treatment System UV Disinfection	15 (e)													
SP-13	Effluent from Blackwater/Graywater Treatment System	15 (e)	5	5	5	5	5	5+2QC	5	5	5	5			

Table 3-1 (Continued)

Sampling Point Number	Sampling Point Name	Micros	Vol	Semivol	Total Metals	Dissolved Metals (a)	Cyanide (b)	HEM/ SGT-HEM	BOD	Solids	Group I	Group II	Pest (c)	D/F	PCB
SP-14	Effluent from Blackwater/Graywater Treatment System (Duplicate)	3+3QC	2+4QC	1+2QC	2+4QC	2+4QC	1+2QC		1	2	2+4QC	1+2QC			
SP-15	Combined Graywater and Blackwater/ Graywater Treatment System Waste Sludge		1	1	1		1				1	1			
SP-16	Final Combined Discharge from Graywater and Blackwater/Graywater Treatment Systems	15 (e)	5	5	5	5	5	5	5	5	5	5			
SP-17	Source Water	1	1	1	1	1	1		1	1	1	1			
SP-18	Trip Blank		1												
SP-19	Equipment Blank			1	1	1									
Total Number of Samples (Excluding QC)		**101**	**37**	**38**	**38**	**36**	**36**	**30**	**36**	**36**	**36**	**36**	**2**	**2**	**1**

(a) Dissolved metals samples will be analyzed for filterable waste streams only.
(b) Cyanide includes both total and available cyanide.
(c) Pesticides includes both organo-phosphorous and organo-halide pesticides.
(d) Two grab samples per day for one day.
(e) Three grab samples per day for five days.

Micros - Fecal coliforms, E. coli, and enterococci.
Vol - Volatile organics.
Semivol - Semivolatile organics.
HEM/SGT-HEM - Hexane extractable material and silica gel treated hexane extractable material.
BOD - Biochemical oxygen demand.
Solids - Settleable solids.
Group I - Total suspended solids (TSS), total dissolved solids (TDS), sulfate, chloride, and alkalinity.
Group II - Total organic carbon (TOC), chemical oxygen demand (COD), ammonia as nitrogen, nitrate/nitrite as nitrogen, total Kjeldahl nitrogen (TKN), and total phosphorus.
QC - With the exception of microbiologicals, QC samples include sample volume for both a matrix spike and a matrix spike duplicate (i.e., two samples). For microbiologicals, QC samples refer to confirmation analyses performed on 10% of the samples
Pest-Organophosphorous pesticides
D/F-Dioxins and Furans
PCB-Chlorinated Biphenyls Congeners

Table 3-2

Summary of Sample Container and Preservation Requirements

Parameter	Sample Container	On-Board Preservation (d)
Fecal Coliforms	120 ml sterile bottle (c)	100 mg/L $Na_2S_2O_3$, 4°C
E. coli	120 ml sterile bottle (c)	100 mg/L $Na_2S_2O_3$, 4°C
Enterococci	120 ml sterile bottle (c)	100 mg/L $Na_2S_2O_3$, 4°C
Volatile Organics	Two 40-mL glass vials (c)	3 granules (10 mg) or 7 drops $Na_2S_2O_3$ per vial, 2 drops HCl per vial, 4°C
Semivolatile Organics	Two 1-L amber glass bottles	80 mg/L (8 mL/L) $Na_2S_2O_3$, 4°C
Total Metals	1-L plastic bottle	None required
Dissolved Metals	1-L plastic bottle	0.45 um filtration
HEM/SGT-HEM	1-L wide mouth glass jar (c)	HCl or H_2SO_4 to pH <2, 4°C
Cyanide, Total	500-mL plastic bottle	Ascorbic acid (0.6 g/L) to remove Cl_2, NaOH to pH >12, 4°C. If sulfide is present, add lead carbonate to precipitate sulfide (e.g., 44 mg/500 mL for sulfide concentration of 1 mg/L), followed by 0.45 µm filtration and raising pH
Cyanide, Available	500-mL amber glass bottle	Ascorbic acid (0.6 g/L) to remove Cl_2, NaOH to pH >12, 4°C. If sulfide is present, add lead carbonate to precipitate sulfide (e.g., 44 mg/500 mL for sulfide concentration of 1 mg/L), followed by 0.45 µm filtration and raising pH
Biochemical Oxygen Demand (5-day)	1-L plastic bottle	4°C
Settleable Solids	1-L plastic bottle	4°C
Group I (a)	1-L plastic bottle	4°C
Group II (b)	1-L and 500 mL glass bottles	H_2SO_4 to pH <2, 4°C
Dioxins and Furans	Two 1-L amber glass bottles	If pH>9, H_2SO_4 to pH 7-9 80 mg/L (8 mL/L) $Na_2S_2O_3$, 4ºC
Organo-Phosphorus Pesticides	Two 1-L amber glass bottles	NaOH or H_2SO_4 to pH 5-9 80 mg/L (8 mL/L) $Na_2S_2O_3$, 4ºC

Table 3-2 (Continued)

Parameter	Sample Container	On-Board Preservation (d)
Organo-Halide Pesticides	Two 1-L amber glass bottles	NaOH or H_2SO_4 to pH 5-9 80 mg/L (8 mL/L) $Na_2S_2O_3$, 4ºC
Chlorinated Biphenyls Congeners	Two 1-L amber glass bottles	H_2SO_4 to pH 2-3 80 mg/L (8 mL/L) $Na_2S_2O_3$, 4ºC

(a) Group I includes total dissolved solids (TDS), total suspended solids (TSS), sulfate, chloride, and alkalinity.
(b) Group II includes total organic carbon (TOC), chemical oxygen demand (COD), ammonia as nitrogen, nitrate/nitrite as nitrogen, total Kjeldahl nitrogen (TKN), and total phosphorus.
(c) Grab samples for microbiologicals, volatile organics, HEM/SGT-HEM analysis will be collected separately for each composite aliquot.
(d) Addition of sodium thiosulfate and ascorbic acid is required only if residual chlorine is present in the sample at a concentration greater than 0.03 mg/L.

Table 3-3

Summary of Sampling Locations, Flow Measurement Techniques, and Sample Collection Types
Holland America Oosterdam

Sampling Point Number	Sampling Point Description	Sampling Location	Flow Measurement Technique	Sample Collection Type
SP-1	Accommodations Wastewater Characterization	Accommodations holding tank discharge pumps.	Install strap-on flow meter on effluent pipe from accommodations holding tank, prior to junction with graywater main. Alternatively, obtain information regarding pumping schedule from accommodations holding tank (e.g., timed pumping or level-control pumping), plus rate and typical duration of pumping. Obtain instantaneous tank level data recorded for the accommodations holding tank by the ship’s control system for a typical multi-day cruise.	Need to install “T” sample tap (if only one pump used) or “H” sample tap (if both pumps used). Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-2	Laundry Wastewater Characterization	Laundry holding tank discharge pumps.	Install strap-on flow meter on effluent pipe from laundry holding tank, prior to junction with graywater main. Flow meter installation may not be feasible due to close proximity to pumps and other sources of turbulence. Alternatively, obtain information regarding pumping schedule from laundry holding tank (e.g., timed pumping or level-control pumping), plus rate and typical duration of pumping. Obtain instantaneous tank level data recorded for the laundry holding tank by the ship’s control system for a typical multi-day cruise.	Need to install “T” sample tap (if only one pump used) or “H” sample tap (if both pumps used). Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.

Table 3-3 (Continued)

Sampling Point Number	Sampling Point Description	Sampling Location	Flow Measurement Technique	Sample Collection Type
SP-3	Galley Wastewater Characterization	Influent to crew galley grease trap.	Install strap-on flow meter on influent pipe to crew galley grease tap. Flow meter installation may not be feasible due gravity-flow piping, which may be less than 50% full. Alternatively, obtain information regarding pumping schedule from the crew galley tank (e.g., timed pumping or level-control pumping), plus rate and typical duration of pumping. Obtain instantaneous tank level data recorded for the crew galley tank by the ship's control system for a typical multi-day cruise.	Need to install "T" sample tap on existing sample tap (#13). Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-4	Food Pulper Wastewater Characterization, Vacuum Tank	Vacuum drain tank inlet pipe to drain tank.	Not applicable. Will coordinate with ship's crew to determine when the vacuum drain tank is pumped to the ballast tank. Start and stop times and pumping rates obtained from the control room will be used to determine flow volume.	Need to install sample tap on horizontal section of inlet piping to improve flow to sample tap. Collect manual composite sample using equal volumes of wastewater pumped from the vacuum tank during a 24-hour sampling period.
SP-5	Food Pulper Wastewater Characterization, Centrifuge	Centrifuge/decanter inlet pipe to drain tank.	Not applicable. Will coordinate with ship's crew to determine what dates/times the centrifuge is pumped to the ballast tank. Start and stop times and pumping rates obtained from the control room will be used to determine flow volume.	Need to install sample tap on horizontal section of inlet piping to improve flow to sample tap. Single grab sample.
SP-6	Influent to Graywater Treatment System	Influent to vibratory filter.	Install strap-on flow meter on influent pipe to vibratory filter. Compare flow measurements with existing flow meter at influent to vibratory filter. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Need to install "T" sample tap on existing sample tap (#7) on influent pipe to vibratory filter. Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-7	Influent to Graywater Treatment System UV Disinfection	Influent to newly installed UV disinfection.	None required. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Use existing sample tap on influent to UV disinfection for collection of grab samples for microbiologicals analysis only.

Table 3-3 (Continued)

Sampling Point Number	Sampling Point Description	Sampling Location	Flow Measurement Technique	Sample Collection Type
SP-8/SP-9	Effluent from Graywater Treatment System	Effluent from newly installed UV disinfection.	Install strap-on flow meter on effluent pipe from UV disinfection, prior to combination with the effluent from the blackwater/graywater treatment system. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Need to install “T” sample tap on effluent from UV infection. Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-10	Incinerator Ash	Incinerator ash hopper.	Not applicable. Obtain typical incinerator ash generation rates during sampling episode.	Manual grab sample from incinerator ash hopper.
SP-11	Influent to Blackwater/Graywater Treatment System	Piping on the outlet from the buffer tank discharge pumps, prior to the SWECO filter.	Install strap-on flow meter on buffer tank outlet piping located in the buffer tank space. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Need to install “T” sample tap (if only one pump used) or “H” sample tap (if both pumps used). Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-12	Influent to Blackwater/Graywater Treatment System UV Disinfection	Influent to newly installed UV disinfection.	None required. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Use existing sample tap on influent to UV disinfection for collection of grab samples for microbiologicals analysis only.
SP-13/SP-14	Effluent from Blackwater/Graywater Treatment System	Effluent from newly installed UV disinfection.	Install strap-on flow meter on effluent pipe from UV disinfection, prior to combination with the effluent from the blackwater/graywater treatment system. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Need to install “T” sample tap on effluent from UV infection. Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.
SP-15	Combined Graywater and Blackwater/Graywater Treatment System Waste Sludge	Existing combined waste sludge sample tap.	None required. Obtain typical waste sludge generation rates for each wastewater treatment system during sampling episode.	Use existing sample tap to collect a single grab sample while biosludge from the blackwater/graywater treatment system is wasted.
SP-16	Final Combined Discharge from Graywater and Blackwater/Graywater Treatment Systems	Final discharge of combined wastewater treatment effluent.	Install strap-on flow meter on combined final discharge pipe. Compare flow measurements with existing flow meter at this location. Obtain ROCHEM control system flow data for a typical multi-day cruise.	Need to install “T” sample tap on existing sample tap on discharge pipe. Composite samples collected from one side of the sample tap, and grab samples collected from the other side of the sample tap.

Table 3-3 (Continued)

Sampling Point Number	Sampling Point Description	Sampling Location	Flow Measurement Technique	Sample Collection Type
SP-17	Source Water	Ship's potable water system following any chlorination, end of distribution.	None required. Obtain information regarding water bunkering during sampling episode.	Single grab sample.
SP-18	Trip Blank	Sanpling crew sampling room	Not applicable.	Single grab sample.
SP-19	Equipment Blank	Sample tap and sampling equipment (i.e., automatic sampling machine).	Not applicable.	HPLC water pumped through representative sample tap and sampling equipment. Single grab sample. Please provide an extra sample tap ("T" or "H") for use in preparing the equipment blank.

Table 3-4

Standard Analytical Methods and Procedures for Samples Collected On Board the Oosterdam

Method No.	Title	Method Type
SM 9222D	Fecal Coliforms	Membrane filtration
SM 9223B	Escherichia Coli (E. coli)	Multiple tube/multiple well
ASTM D6503-99	Enterococci	Multiple tube/multiple well
EPA 160.2	Residue, Non-filterable (TSS)	Gravimetric
EPA 160.5	Settleable Matter (SS)	Volumetric
EPA 160.1	Total Dissolved Solids (TDS)	Gravimetric
SM 2320 B	Alkalinity	Titrimetric
EPA 375.1, 375.3, or 375.4	Sulfate	Colorimetric, Gravimetric, or Turbidimetric
EPA 325.2 or 325.3	Chloride	Colorimetric or Titrimetric
EPA 351.2, 351.3, or 351.4	Total Kjeldahl Nitrogen (TKN)	Colorimetric, Titrimetric, or Potentiometric
EPA 350.1, 350.2, or 350.3	Ammonia as Nitrogen	Colorimetric, Titrimetric, or Potentiometric
EPA 353.1, 353.2, or 353.3	Nitrate/Nitrite as Nitrogen	Colorimetric or Spectrophotometric
EPA 365.2 or 365.4	Total Phosphorus	Colorimetric
EPA 405.1	Biochemical Oxygen Demand (BOD_5)	Titrimetric
EPA 410.1, 410.2, 410.3, or 410.4	Chemical Oxygen Demand (COD)	Titrimetric or Colorimetric
EPA 415.1	Total Organic Carbon (TOC)	Combustion or Oxidation
EPA 335.2	Total Cyanide	Titrimetric or Spectrophotometric
EPA 1677	Available Cyanide	Flow Injection, Ligand Exchange, Amperometry
EPA 1664A	Hexane Extractable Material and Silica Gel Treated Hexane Extractable Material (HEM/SGT-HEM)	Gravimetric

Table 3-4 (Continued)

Method No.	Title	Method Type
EPA 200.7, 200.8, 200.9, and 245.7 (Mercury only)	Metals by Inductively Coupled Plasma Atomic Emission Spectrometry, Mass Spectrometry, and Atomic Absorption Spectroscopy	GFAA, ICP, ICP/MS and CVAA
SM 2340B	Hardness by Calculation	Calculation from metals results
EPA 624	Volatile Organic Compounds by GC/MS	GC/MS
EPA 625	Semivolatile Organic Compounds by GC/MS	GC/MS
EPA 1613B	Dioxins and Furans by Isotope Dilution HRGC/MS	HRGC/MS
EPA 1657	Organo-Phosphorous Pesticides	GC-FPD
EPA 1656	Organo-Halide Pesticides	GC-HSD
EPA 1668A	Chlorinated Biphenyls Congeners by Isotope Dilution HRGC/MS	HRGC/MS

Table 3-5

Sampling Point Field Measurements

Field Measurements	Method	Frequency
Temperature	Thermometer	Each time grab samples (e.g., VOCs) are collected
Turbidity	Turbidity meter	Each time grab samples (e.g., VOCs) are collected
Salinity	Salinity meter	Each time grab samples (e.g., VOCs) are collected
Conductivity	Conductivity meter	Each time grab samples (e.g., VOCs) are collected
Sulfide	Colorimetric test kit	Each time grab samples (e.g., VOCs) are collected.
pH	Four color indicator strip	Each time grab samples (e.g., VOCs) are collected
Hardness	Titrimetric test kit	Each time grab samples (e.g., VOCs) are collected
Free and Total Chlorine	Colorimetric test kit	Each time grab samples (e.g., VOCs) are collected

Flow Meter Measurement Data Sheet

Vessel:						**Discharge:**					
Meter Information											
Meter Type:		Serial #:					Calibration:				
Install Location:							Date:	Time:		Gallons:	
De-Install Information:							Date:	Time:		Gallons:	
Day/ Date	**Time**	**Gallons**		**V_s**	**Alarms**	**Day/Date**	**Time**	**Gallons**		**V_s**	**Alarms**
		Totalizer	**Daily**					**Totalizer**	**Daily**		

Figure 3-1. Flow Meter Measurement Data Sheet

GRAYWATER GENERATION DATA SHEET

Vessel:
Date:
Recorded By:

Vessel Point(s) of Contact:

Number of Passengers and Number of Crew Actually on Board:

Unusual Maintenance or Operational Activities Described By Vessel Point(s) of Contact:

Number and Time of Meals Served by Day (include passengers and crew) :

Breakfast:
Lunch:
Dinner:
Other Meals:

Were Dishwashers Operated? (Circle one) Yes / No

If yes, what weight, number of pieces, or number of loads were washed?
What times were dishes washed by day?
Estimated volume of water per load:
Detergent name (obtain MSDS if available):

Was Laundry Washed? (Circle one) Yes / No

If yes, number of hours per day laundry was operated:
Weight, number of pieces, or number of loads washed per day:
What times were dishes washed by day?
Estimated volume of water per load:
Are there floor drains in the laundry? What and where do they drain?

Detergent and other chemicals names (obtain MSDS if available):

Other Sources (e.g., small pantries, steward stations, cleaning stations):
Times these sources are generated:
Estimated volume per source:

Figure 3-2. Graywater Generation Data Sheet

SPECIAL WASTES GENERATION AND DISPOSITION DATA SHEET

Vessel:
Date:
Recorded by:

Photo Lab(s) On Board: yes or no (circle one)
Print Shop(s) On Board: yes or no (circle one)
Dry Cleaning On Board: yes or no (circle one)
Chemical Storage Area On Board: yes or no (circle one)
Medical Infirmary On Board: yes or no (circle one)
Garbage Room On Board: yes or no (circle one)

For each of the above areas, describe the following:

Waste handling and disposition:

Any waste treatment (e.g., silver recovery in photo lab)? What is the disposition of treated waste and any residuals (e.g., silver recovery filter and filtrate)?

Inspect area for floor drains. Are drains blocked or open? Where do the floor drains lead? Describe any streams that enter the floor drains.

Inspect area for sinks. Is sink drain blocked or open? What is the disposition of sink water? What streams enter or potentially the sink (e.g., hand washing, rinse/clean equipment, prepare chemical solutions)?

Inspect area for chemical storage. Are chemicals stored over a sump or other secondary containment?

Figure 3-3. Special Wastes Generation and Disposition Data Sheet

PESTICIDE, FUNGICIDE, AND RODENTICIDE USE DATA SHEET

Vessel:
Date:
Recorded by:

Pesticides Used On Board: yes or no (circle one)

Pesticide Name	Target Pest(s)	Amount Used/yr	MSDS Obtained (yes/no)
________________	______________	____________	____________
________________	______________	____________	____________
________________	______________	____________	____________

List Locations Where Pesticides are Normally Applied and Stored On Board and Dates Applied:

Potential to Enter Graywater/Blackwater Systems (e.g., application, spills, floor drains)?

Person(s) Responsible for Pesticide Application:

Fungicides Used On Board: yes or no (circle one)

Fungicide Name	Target Fungi	Amount Used/yr	MSDS Obtained (yes/no)
________________	______________	____________	____________
________________	______________	____________	____________
________________	______________	____________	____________

List Locations Where Fungicides are Normally Applied and Stored On Board and Dates Applied:

Potential to Enter Graywater/Blackwater Systems (e.g., application, spills, floor drains)?

Person(s) Responsible for Fungicide Application:

Rodenticides Used On Board: yes or no (circle one)

Rodenticide Name	Target Rodent	Amount Used/yr	MSDS Obtained (yes/no)
________________	______________	____________	____________
________________	______________	____________	____________
________________	______________	____________	____________

List Locations Where Rodenticides are Normally Applied and Stored On Board and Dates Applied:

Potential to Enter Graywater/Blackwater Systems (e.g., application, spills, floor drains)?

Person(s) Responsible for Rodenticide Application:

Figure 3-4. Pesticide, Fungicide, and Rodenticide Use Data Sheet

COLLECTION, HOLDING, AND TRANSFER (CHT) TANK DATA SHEET

Vessel:
Date:
Recorded by:

Tank Number or Identification:

Wastewater Source(s):

Tank Volume:________ m^3 or gallons

Does the Tank Have Vacuum: yes or no (circle one):

Vacuum: ____ mm Hg

Tank Material of Construction:

Is this a double bottom tank: yes or no (circle one)?

Normal Operating Volume: ______ m^3

Automated Tank Gauging and Discharge System: yes or no (circle one)

Discharge Type: batch or continuous (circle one)

Totalizer or Flow Meter on Discharge Line: yes or no (circle one)

Discharge Flow Rate: _____ m^3/min or m^3/day

Wastewater Destination After Leaving the Tank:

Approximate Diameter of Discharge Line: ______ inches

Screens or Filters Present on Either Influent or Discharge Lines (describe):

Chemical Additions to Tank:

Chemical Name	Purpose	Amount	MSDS (yes/no)
__________________	______________	_______ kg/day	____________
__________________	______________	_______ kg/day	_____________
__________________	______________	_______ kg/day	_____________

Is sludge removed from this tank (describe frequency, amount, destination)?:

Figure 3-5. Collection, Holding, and Transfer (CHT) Tank Data Sheet

WASTEWATER TREATMENT UNIT DATA SHEET

Vessel:
Date:
Recorded by:

Description of Treatment Unit:

Manufacturer:

Model:

Design Drawings Obtained: yes or no (circle one)

Design Capacity: _________ gpd or gpm (circle one)

Typical Operating Flow Rate: _________ gpd or gpm (circle one)

Operational period: _____ hours

Chemical Additions:

Chemical	Amount	Units	MSDS Obtained
_______________	___________	______	___________
_______________	___________	______	___________
_______________	___________	______	___________

Electrical Requirements:

Volts: _____ Amps: ______ Horsepower: ________

Sludge Generation: yes or no (circle one)
If yes, describe frequency, amount, and destination:

Was maintenance performed on treatment unit: yes or no (circle one)
If maintenance was performed, estimate labor: ______ hours

List operating parameters recorded (e.g., flow, temperature, pressure, pH), typical values, and range for this unit. Record or obtain copy or printout of logs for the duration of the sampling episode.

Figure 3-6. Wastewater Treatment Unit Data Sheet

SOURCE WATER DATA SHEET

Vessel:
Date:
Recorded by:

Is Potable Water Generated On Board the Vessel: yes or no (circle one)

Describe the On-Board Potable Water Treatment and Disinfection Method:

Port (City) Where Source Water is Obtained if Not Generated On Board: ________________

Treatment Method for Source Water Obtained in Port:

Disinfection Method for Source Water Obtained in Port:

Fluoride Added to Water Obtained in Port: yes or no (circle one)

Additional Disinfection Performed On Water Obtained in Port: yes or no (circle one)

Describe Additional On-Board Disinfection Method:

Description of Source Water Sample Collection Point On Board Cruse Ship:

Figure 3-7. Source Water Data Sheet

Sampling Episode ______

Preservation Chemicals - List Strength of Solution from Bottle

HCl ________________ Ascorbic Acid____________

H_2SO_4 _____________ NaOH ____________

$Na_2S_2O_3$ ____________ Lead Carbonate____________

Sample Number	Analysis	Date	Name	Chemical	Initial pH	Final pH	Number of Drops

Figure 3-8. Sample Preservation Log Sheet

Date: ___________

Sampling Episode: __________

Sampling Point: ___________

Sample Numbers: ______________________

Manual Composite ☐ Grab ☐

Automatic Composite ☐

Time of Compositing period, if applicable:

Start Time ________ ☐ AM ☐ PM

End Time _________ ☐ AM ☐ PM

Equipment Used: ____

Samplers' Names: ____

Aliquot	Time	Temp °C	Turbidity (NTU)	pH	Sulfide (mg/L)	Salinity (ppt)	Conductivity (µS/cm)	Free Chlorine (mg/L)	Total Chlorine (mg/L)
1									
2									
3									
4									
5									
6									
Composite									

Notes: (include observations of odor and color of each aliquot, take pictures if necessary)

____

____

____

____

____

____

Figure 3-9. Field Sampling Log Sheet

EPA

United States
Environmental Protection Agency
Washington, DC 20460

EPISODE NO:

RANGE OF SAMPLE NOS:

TRAFFIC REPORT
USEPA ENGINEERING AND ANALYSIS DIVISION
SAMPLE CONTROL CENTER

Return completed form to:
P.O. BOX 1407
ALEXANDRIA, VA 22313
(703) 519-1140

INDUSTRIAL FIRM SAMPLED	SHIPPING & INFORMATION
NAME:	SHIP TO:
CITY:	ATTN:
STATE:	CARRIER:
INDUSTRIAL CATEGORY:	AIRBILL:
	DATE SHIPPED:
CONFIDENTIAL (Y/N):	SAMPLING OFFICE/SAMPLER:

SAMPLE POINT DESCRIPTION											SAMPLE ANALYSES						
SAMPLE NUMBER	SOURCE WATER (city, river, well)	IN LINE PROCESS	UNREATED EFFLUENT (raw wastewater)	TREATED EFFLUENT	OTHER (specify)	ADDITIONAL SAMPLE DESCRIPTION	PH LEVEL	PRESERVED (Y/N)	G=GRAB / C=COMPOSITE	SAMPLE COLLECTION TIME / DATE							

Comments:

EPA Form 7500-50 (Rev 6-94) Previous editions are obselete.
Page 1: Sampled Contrl Center Copy
Copy of Page 1: Sampler Copy

Page 2: Lab Copy
Copy of Page 2: Lab Copy for return to sample control center

Figure 3-10. Example Traffic Report

4.0 SAMPLING ACTIVITIES

This section discusses the sampling team organization, ship visit preparation, and sampling activities.

4.1 Sampling Team Organization

The sampling crew will consist of Donald Anderson from EPA, a crew chief (Mark Briggs), eight crew members, and two laboratory analytical contractors who will be responsible for all on-board laboratory analyses. The crew chief will be responsible for all sample collection, preservation, and shipping activities on board. After completion of the sampling episode, the analytical results from each laboratory will be collated. This information will be summarized and transmitted, along with a trip report, to EPA. After EPA review, the report will be forwarded to the cruise line for their review.

4.2 Pre-Visit Preparation

As a part of preparing the team for the sampling event on board the Oosterdam, the crew chief will distribute the Holland America Oosterdam Sampling and Analysis Plan to each team member and make sure they are completely familiar with the sampling plan and the health and safety requirements specific to the Oosterdam found in Section 6.0. Cruise vessel personnel shall also be given copies of this sampling and analysis plan prior to the start of sampling.

The crew chief will coordinate the procurement and shipment of all necessary sampling and health and safety equipment.

Upon arrival on Saturday September 11, two members of the sampling crew will attend a health and safety briefing lead by the ship's Environmental Officer and begin to set up sampling equipment. On Monday September 13, laboratory analytical contractors will load and set up the on-board laboratory. On Saturday September 18, seven additional sampling crew members, the two laboratory analysts, and Donald Anderson from EPA will board the ship. These individuals will also receive a health and safety briefing and then will begin sampling. The crew will tour the sampling points and discuss the detailed health and safety considerations (e.g., the hazards associated with each sampling point, related personal protective equipment, and evacuation requirements). If conditions exist which are different than those anticipated, modifications will be made in consultation with EPA and Oosterdam personnel. If necessary, additional equipment and glassware will be obtained. A detailed schedule of the activities for the sampling episode is provided in Appendix C.

4.3 Field Sampling Activities

On board the Oosterdam, the two crew members designated to set up sampling equipment, will meet with cruise vessel personnel to determine whether samples can be collected at each of the planned sampling points. Upon making the decision to collect samples, the descriptions of the proposed sampling points will be updated, if necessary, in consultation with EPA and cruise vessel personnel. If necessary, additional equipment and glassware will be obtained. The revised description shall include:

- A sample point description and collection procedure for each sample point;
- A list of the sample fractions to be collected at each point:
- A list of potential physical hazards (such as pH, temperature, and potentially hazardous equipment);
- A list of potential chemical hazards associated with each sample point; and
- A list of proposed health and safety procedures.

Prior to sampling, the crew chief will also notify the Health and Safety Coordinator (Matt Stein) of any revised sampling activity descriptions along with recommended revisions to the proposed health and safety procedures. Together, they will review the proposed health and safety procedures, incorporate specific changes indicated by the Health and

Safety Coordinator, and gain approval for sampling from the Health and Safety Coordinator before proceeding with sampling activities.

Sample fractions collected will be labeled, sealed, and placed in coolers for shipment to the laboratories once the cruise vessel docks. The Traffic Report forms will be completed and placed in plastic sleeves inside the coolers. The coolers will then be transported to either one of the contractor's Juneau laboratory or continued shipment via Federal Express to other laboratories. Because of the very short sample holding times for microbiologicals, BOD_5, and SS, an on-board laboratory will be used for analysis of these samples (note that not all BOD_5 and SS samples will be analyzed on board). At the conclusion of the sampling episode, the sampling equipment will be prepared for return shipping.

The crew chief will contact confirm the laboratories to be used and communicate the number of samples being collected. The crew chief will also contact Sample Control Center after shipping samples to communicate shipping information.

4.4 Logistics

This section of the sampling plan summarizes cruise vessel contacts, analytical laboratory contacts and addresses, and sampling team personnel and support functions.

Cruise Ship Contacts

Nick Schowengerdt
Director of Environment
Holland America Cruise Lines
(206) 298-3067

Environmental Officer
Holland America Oosterdam
osdm-environmental_officer@hollandamerica.com

Chief Engineer
Holland America Oosterdam

EPA Contacts

Don Anderson
Engineering and Analysis Division
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code 4303T
Washington, D.C. 20460
(202) 566-1021

Elizabeth Kim
Office of Wetlands, Oceans, and Watersheds
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code 4504T
Washington, D.C. 20460
(202) 566-1270

Sample Control Center

Erin Salo
Sample Control Center
6101 Stevenson Ave.
Fifth Floor
Alexandria, VA 22304
(703) 461-2350
(703) 461-8056 (fax)

Analytical Laboratories

<u>Classical Wet Chemistry and Metals</u>
Q Biochem (QBC)
1401 Municipal Road, NW
Roanoke, VA 24012
(540) 265-7211
(540) 563-4866 (fax)
Contact: Cheryl Daniel

Saturday delivery to:
3875 Thirlane Road
Roanoke, VA 24019

<u>Volatile and Semivolatile Organics</u>
Ecology & Environment, Inc. (E&E)
4493 Walden Avenue
Lancaster, NY 14086
(716) 685-8080
(716) 685-0852 (fax)
Contact: Caryn Wojtowicz

<u>Pesticides</u>
Pacific Analytical Inc.
6056 Corte del Cedro
Carlsbad, CA 92009
(760) 496-2200
(760) 931-9479 (fax)
Contact: Steve Parsons

<u>Dioxins/Furans and PCBs (except ash samples)</u>
Axys Analytical Services, Ltd.
2045 Mills Road West
Sidney, BC V8L 3S8
CANADA
(250) 655-5800
(250) 655-5811 (fax)
Contact: Dr. Laurie Phillips

<u>Dioxins/Furans (ash samples only)</u>
Gascoyne - Microbac Laboratory
Attn: Mike Arbaugh
2101 Van Deman Street
Baltimore, MD 21224
410-633-1800 ext. 115

<u>Available Cyanide</u>
Bayer Polymers LLC
HSE Testing Laboratory
100 Bayer Rd. Building 8
Pittsburgh, PA 15205
(412) 777-4803
Contact: Dr. Carl Thompson

Microbiologicals, BOD_5, and Settleable Solids
Analytica Alaska, Inc.
5438 Shaune Drive
Juneau, AK 99801
(907) 780-6668
(907) 456-3116
Contact: David Wetzel

Eatern Research Group Contacts

Debbie Falatko (Project Manager) - Chemical Engineer
Kim Porter - Environmental Scientist
Mark Briggs - Environmental Engineer
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
(703) 633-1600

Freight Forwarders

Federal Express
9203 Bonnett Way
Juneau, Alaska 99801
General Information (800) 238-5355
Weekday Hours: 7:30 am to 5 pm
Last Express Drop-off: 8:30 am, no Sat pickup

Federal Express (Drop-off):
Mail Boxes Etc.
125 Main Street
Ketchikan, AK 99901
(907) 247-2705
(907) 247-2707 (fax)
Drop-off by 9:30 a.m., Monday - Friday

Federal Express (Pick-up)
Sitka, AK
Federal Express pick-up by 8:30 a.m.

Federal Express (Drop-off):
Macdonalds Ltd.
407 Lincoln St.
Sitka, AK 99835
Drop-off by 9:30 a.m.

Alaska Airlines Goldstreak Air Cargo
General Information (800) 634-7113

Skagway Air
General Information (907) 983-2218

Courier Services

To be determined.

5.0 SAMPLE SHIPMENT

All sample packages will be labeled with standard address labels. All samples will be tracked using Traffic Report forms. Custody will be maintained by the crew chief from sample collection through shipment (or transfer to analytical contractor's on-board laboratory).

All samples will be packaged and shipped in accordance with DOT or IATA regulations. The general IATA packaging requirements for air shipment are as follows:

- "Inner packaging must be so packed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the outer packaging during normal conditions of transport. Cushioning material must not react dangerously with the contents of the inner packaging. Any leakage of the contents must not substantially impair the protective properties of the cushioning material. Unless otherwise provided in this paragraph or in the Packing Instructions, liquids in Classes, 3, 4, 5, 6, or 8 of Packing Groups I or II in glass or earthenware inner packaging, must be packaged using material capable of absorbing the liquid. Absorbent material must not react dangerously with the liquid. Absorbent material is not required...." (IATA Dangerous Goods Regulations, 5.0.16).

- "When filling receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to prevail during transport. Liquids must not completely fill a receptacle at a temperature of 55°C (130°F)." (IATA Dangerous Goods Regulations, 5.0.12).

The packing and labeling procedures in the following subsections may be used for non-hazardous samples. Hazardous samples will be identified based on consultation with the hazardous shipments contact, and appropriate hazardous shipping procedures will be followed. Based on process considerations, samples collected on board large cruise vessels will not be classified as IATA dangerous goods.

5.1 Sample Set Preparation

Samples are collected as a series of "fractions," or bottles designated for particular analyses requiring the same preservation. The comprehensive water sample set consists of sample fractions for all pollutants listed in Section 3.2 collected over a 24-hour period.

At the end of the compositing period, sampling points SP-1, SP-2, SP-3, SP-4, SP-6, SP-8/SP-9, SP-11, SP-13/SP-14 and SP-16 will include approximately 20 liters of sample collected in two 10-L composite sample containers. The content of the composite sample containers will be thoroughly mixed using a third, clean composite sample container. To perform this mixing, half of each composite sample container will be poured into the third jar then the two half-full composite sample containers will be combined into one. Repeat this process two more times to ensure proper mixing. Sample fractions will be poured from the composite sample containers into individual sample bottles using the following procedure.

- Swirl and shake the composite sample container to re-suspend settled solids;
- Fill each sample bottle to about ½ of its empty volume;
- Mix the remaining volume in the composite sample container; and
- In reverse order, fill the sample bottles.

Cyanide samples will be composited separately from the other pollutant parameters. Up to four grab samples during each 24-hour sampling period will be collected for cyanide analyses in separate 1-L amber glass jars and preserved according to Table 3-2. After the sampling period ends, the four one liter grab samples will be composited by mixing in a sampling point-specific composite jar and then poured into separate bottles for analysis of total and available cyanide.

HEM/SGT-HEM samples will be composited during sample collection by collecting the individual grab samples directly into the sample containers. For example, at sampling points where a total of four grab samples will be collected during a 24-hour sampling period, approximately one-fourth (250 mL) of the sample containers will be filled when each of the four grab samples are collected, resulting in full sample containers at the end of each sampling period.

5.2 Sample Packing

All samples from the Oosterdam will be packed according to the following guidelines:

1. Tighten the lid on each filled sample bottle, being careful not to overtighten the lid. Clean the sample bottle with a cloth rag or paper towel.

2. Label each sample bottle. (Sample labeling is discussed in Section 3.6 of this document.) Cover the label with clear tape to protect this information.

3. Wrap each glass sample bottle with "bubble wrap". The bubble wrap must fit snugly and completely cover the sample bottle. Each "bubble-wrapped" container and plastic container must then be enclosed in an individual sealable plastic freezer bag.

4. Place two garbage bags inside each other in a cooler.

5. Place sample bottles in garbage bags in the cooler with proper end up and close bag with twist-tie.

6. Arrange sealed plastic freezer bags filled with ice (or chemical ice) on top of the sample bottles (if ice is to be used as a preservative). Put at least 4 x ½ gallons of ice (4 x 2.5 lbs of ice) in each large cooler and 2 x ½ gallons of ice (2 x 2.5 lbs of ice) in each small cooler. More ice should be used when ambient temperatures are very high. The ice should be placed inside the second garbage bag. Close the second garbage bag with a twist-tie. Any additional free space should be filled with packing material so that the sample containers will not shift during shipment.

7. Seal the Traffic Report form in a plastic sleeve and tape securely to the inside of the cooler lid.

8. Place a "Return to ..." label on the inside of the cooler lid.

9. Close cooler.

10. Make several wraps with strapping tape around the cooler perpendicular to the seal to ensure that the lid will remain closed if the latch is accidentally released or damaged.

11. Tape the cooler drain plug so it will not open.

12. Place a completed address label on the lid of the cooler including name, address, and telephone number of the receiving laboratory and the return address and telephone number of the shipper.

6.0 SHIP-SPECIFIC HEALTH AND SAFETY PROCEDURES

This section specifies the health and safety procedures and practices to be used by the sampling team during sampling on board Holland America Oosterdam. This section is a supplement to the General Health and Safety Plan for Large Cruise Ships, and provides general health and safety information for this sampling episode. The sampling team is obligated to follow all safety protocols delineated in the General Health and Safety Plan for Large Cruise Ships and the procedures specified in this section.

Sampling personnel are required to wear nonskid, steel-toed shoes, long sleeves, and long pants at all times while in sampling, preserving, or otherwise handling samples. Nitrile gloves, safety glasses with side shields (or goggles) must be worn when collecting and preserving samples. Contact lenses may be worn with goggles. Dust masks or face shields are optional equipment at sampling points unless there is a splash potential (i.e., sampling port is located at sampler's waist level or higher). Hearing protection will be worn in all ship machinery areas and other ship spaces where hearing protection requirements are posted. Heat resistant gloves and Tyvek suits will be worn as needed at each sampling station for protection from splash or hot samples, or as required by ship safety protocol. Ship supervisors in sampling areas will be notified prior to sampling. Sampling personnel will keep MSDSs for all chemical preservatives in the sampling file box for easy access. Sampling crew will not enter confined spaces (as defined by 29 CFR 1910.146) with any portion of the body.

Prior to the start of sampling activities, sampling crew personnel will attend a formal health and safety briefing conducted by the Oosterdam's Environmental Officer. The briefing will address all health and safety issues for personnel working on the ship, including special signals, alarm systems, evacuation routes and assembly points, emergency phone numbers and procedures, and the location of the on-board medical clinic. In addition, the briefing tour will include a tour of the sampling areas, during which the sampling team will be advised of any sampling point-specific health and safety hazards, as well as the locations of to emergency eyewashes and safety showers.

Before sampling at any point, crew members will locate the nearest eyewash and safety shower. If an eyewash in not available in the immediate vicinity of the sampling area, a portable eyewash unit will be stationed in that area for use during sampling and sample preservation.

6.1 Sampling Point-Specific Safety Procedures

All sampling team members will be advised of any sampling point-specific safety protocol during the formal on-ship health and safety briefing. A summary of all the known sampling point-specific safety hazards is provided in Table 6-1 along with the personal protective equipment (PPE) required at each sampling point. The sampling crew health and safety officer (HSO) and the sampling team will inspect each sampling point area to identify unique or additional hazards not already covered in this plan or during the formal health and safety briefing. If additional hazards are found, the sampling crew will be informed of each hazard and required control measures prior to the start of work. Where identified hazards may affect the ship's personnel, the HSO will notify an appropriate member of the ship's crew.

6.2 Physical Hazards

The use of narrow walkways or steep stairs may be necessary to access sampling points. Prior to use, the walkways and stairs will be inspected. If platforms are defective (e.g., rails missing or unsecured walkways), ship personnel will be notified immediately. Sampling personnel will not use these access points until appropriate control measures have been implemented or an alternate route is established. Crew members must have one hand free to hold the railing when using narrow stairways. Samplers will not block aisles, walkways, or areas where ship's personnel routinely work in order to access the sampling point unless it is unavoidable, and the ship's crew is notified.

Noise will be a hazard on certain areas of the ship. Hearing protection will be used by the sampling team where required by the ship, when sampling members are having trouble hearing or being heard when standing three feet or less away from another person, or when deemed necessary by the HSO. Sampling personnel will receive training on the proper use and fitting of hearing protection in the off-ship health and safety training.

6.3 Thermal Hazards

Heat stress may be a concern in the Oosterdam sampling episode. Sampling crew members will potentially become exposed to hot/humid sampling environments as well as thermal or radiant heat generated by equipment. Section 7.0 of the General Health and Safety Plan for Large Cruise Ships should be referred to for specific directions on heat stress prevention, treatment, and monitoring. However, temperatures in the engine room are expected to be comfortable at 20°C to 22°C.

In general, wastewater sampling points are not expected to be hot, since samples are typically collected at the outlet from collection/holding tanks. One possible exception is the galley wastewater characterization sample, which is collected at the inlet to the crew galley grease trap. The incinerator ash sample may also be hot.

6.4 Chemical Hazards

The only chemical hazards expected are chemicals used for the preservation of samples. All sampling crew will be advised of any potential chemical hazards at each sampling point as well as any special PPE recommendations during the formal health and safety briefing on board. If the sampling point is above waist height, a face shield or goggles must be worn during sample collection. In order to avoid the ingestion of chemicals, sampling crew members will be required to wash hands thoroughly before eating, drinking, or smoking. Sampling personnel will not be permitted to enter areas where the ship has determined that respiratory protection equipment is necessary to protect against inhalation hazards.

6.5 Biological Hazards

Domestic sewage may potentially contain blood or other potentially infectious material defined under OSHA's blood born pathogen regulations (29 CFR 1910.1030). Typically, blood will not be present in domestic sewage unless it comes directly from the infirmary area of the ship. OSHA recognizes that contact with raw sewage poses a number of health risks, but does not consider contact with diluted raw sewage is an exposure route for blood born pathogens. Nonetheless, sample crew members who sample the domestic sewage portion of the wastewater treatment system are to be aware of the potential danger and will be outfitted with proper PPE (i.e., nitrile gloves, tyvek suites, splash goggles) to minimize the chance for exposure. PPE required or recommended at each sampling point is described in Table 6-1. Sampling crew members are also recommended to have current Tetanus and Hepatitis A and B immunizations to protect themselves against potential biological hazards.

Table 6-1

Sampling Point-Specific Safety Procedures - Holland America Oosterdam

Sampling Point Number	Sampling Point Description	Physical Hazards (a)	Personal Protective Equipment
SP-1	Accommodations wastewater characterization	None anticipated	None
SP-2	Laundry wastewater characterization	None anticipated	None
SP-3	Galley wastewater characterization	Possibly hot sample	Possibly heat resistant gloves
SP-4	Food pulper wastewater characterization, vacuum tank	Splash potential	Tyvek and face shield (b)
SP-5	Food pulper wastewater characterization, centrifuge	Splash potential	Tyvek and face shield (b)
SP-6	Influent to graywater treatment system	Splash potential	Tyvek and face shield (b)
SP-7	Influent to graywater treatment system UV disinfection	None anticipated	None
SP-8/SP-9	Effluent from graywater treatment system	None anticipated	None
SP-10	Incinerator ash	Potentially hot sample	Possibly heat resistant gloves
SP-11	Influent to blackwater/graywater treatment system	None anticipated	None
SP-12	Influent to blackwater/graywater treatment system UV disinfection	None anticipated	None
SP-13/ SP-14	Effluent from blackwater/graywater treatment system	None anticipated	None
SP-15	Combined graywater and blackwater/ graywater treatment system waste sludge	None anticipated	None
SP-16	Final combined discharge from graywater and blackwater/graywater treatment systems	None anticipated	None
SP-17	Source water	None anticipated	None
SP-18	Trip blank	None anticipated	None
SP-19	Equipment blank	None anticipated	None

(a) Additional physical hazards, if any, will be identified during the formal on-ship health and safety briefing. Updates to this table should be made as found.
(b) Splash protection required if sampling port is waist high or above.

7.0 REFERENCES

1. Eastern Research Group, Inc., Quality Assurance Project Plan for Rulemaking Support for Large Cruise Ships in Alaska Water. March 2004.

Appendix A

LIST OF CONSTITUENTS FOR ANALYSIS

Table A-1

List of Constituents for Analysis - Volatile Organic Analytes

CAS Number	Common Name	Technique	Method
107131	ACRYLONITRILE	GCMS	1624
71432	BENZENE	GCMS	1624
75274	BROMODICHLOROMETHANE	GCMS	1624
74839	BROMOMETHANE	GCMS	1624
75150	CARBON DISULFIDE	GCMS	1624
107142	CHLOROACETONITRILE	GCMS	1624
108907	CHLOROBENZENE	GCMS	1624
75003	CHLOROETHANE	GCMS	1624
67663	CHLOROFORM	GCMS	1624
74873	CHLOROMETHANE	GCMS	1624
10061015	CIS-1,3-DICHLOROPROPENE	GCMS	1624
4170303	CROTONALDEHYDE	GCMS	1624
124481	DIBROMOCHLOROMETHANE	GCMS	1624
74953	DIBROMOMETHANE	GCMS	1624
60297	DIETHYL ETHER	GCMS	1624
107120	ETHYL CYANIDE	GCMS	1624
97632	ETHYL METHACRYLATE	GCMS	1624
100414	ETHYLBENZENE	GCMS	1624
74884	IODOMETHANE	GCMS	1624
78831	ISOBUTYL ALCOHOL	GCMS	1624
108383	M-XYLENE	GCMS	1624
80626	METHYL METHACRYLATE	GCMS	1624
75092	METHYLENE CHLORIDE	GCMS	1624
1-952	O+P XYLENE	GCMS	1624
127184	TETRACHLOROETHENE	GCMS	1624
56235	TETRACHLOROMETHANE	GCMS	1624
108883	TOLUENE	GCMS	1624
156605	TRANS-1,2-DICHLOROETHENE	GCMS	1624
10061026	TRANS-1,3-DICHLOROPROPENE	GCMS	1624
110576	TRANS-1,4-DICHLORO-2-BUTENE	GCMS	1624
75252	TRIBROMOMETHANE	GCMS	1624
79016	TRICHLOROETHENE	GCMS	1624
75694	TRICHLOROFLUOROMETHANE	GCMS	1624
108054	VINYL ACETATE	GCMS	1624
75014	VINYL CHLORIDE	GCMS	1624
75343	1,1-DICHLOROETHANE	GCMS	1624
75354	1,1-DICHLOROETHENE	GCMS	1624

Table A-1 (Continued)

CAS Number	Common Name	Technique	Method
71556	1,1,1-TRICHLOROETHANE	GCMS	1624
630206	1,1,1,2-TETRACHLOROETHANE	GCMS	1624
79005	1,1,2-TRICHLOROETHANE	GCMS	1624
79345	1,1,2,2-TETRACHLOROETHANE	GCMS	1624
106934	1,2-DIBROMOETHANE	GCMS	1624
107062	1,2-DICHLOROETHANE	GCMS	1624
78875	1,2-DICHLOROPROPANE	GCMS	1624
96184	1,2,3-TRICHLOROPROPANE	GCMS	1624
126998	1,3-BUTADIENE, 2-CHLORO	GCMS	1624
142289	1,3-DICHLOROPROPANE	GCMS	1624
123911	1,4-DIOXANE	GCMS	1624
78933	2-BUTANONE	GCMS	1624
110758	2-CHLOROETHYLVINYL ETHER	GCMS	1624
591786	2-HEXANONE	GCMS	1624
67641	2-PROPANONE	GCMS	1624
107186	2-PROPEN-1-OL	GCMS	1624
107028	2-PROPENAL	GCMS	1624
126987	2-PROPENENITRILE, 2-METHYL-	GCMS	1624
107051	3-CHLOROPROPENE	GCMS	1624
108101	4-METHYL-2-PENTANONE	GCMS	1624

57 VOLATILE ANALYTES

Table A-2

List of Constituents for Analysis - Semivolatile Organic Analytes

CAS Number	Common Name	Technique	Method
83329	ACENAPHTHENE	GCMS	1625
208968	ACENAPHTHYLENE	GCMS	1625
98862	ACETOPHENONE	GCMS	1625
98555	ALPHA-TERPINEOL	GCMS	1625
62533	ANILINE	GCMS	1625
137177	ANILINE, 2,4,5-TRIMETHYL-	GCMS	1625
120127	ANTHRACENE	GCMS	1625
140578	ARAMITE	GCMS	1625
82053	BENZANTHRONE	GCMS	1625
108985	BENZENETHIOL	GCMS	1625
92875	BENZIDINE	GCMS	1625
56553	BENZO(A)ANTHRACENE	GCMS	1625
50328	BENZO(A)PYRENE	GCMS	1625
205992	BENZO(B)FLUORANTHENE	GCMS	1625
191242	BENZO(GHI)PERYLENE	GCMS	1625
207089	BENZO(K)FLUORANTHENE	GCMS	1625
65850	BENZOIC ACID	GCMS	1625
1689845	BENZONITRILE, 3,5-DIBROMO-4-HYDROXY-	GCMS	1625
100516	BENZYL ALCOHOL	GCMS	1625
91598	BETA-NAPHTHYLAMINE	GCMS	1625
92524	BIPHENYL	GCMS	1625
92933	BIPHENYL, 4-NITRO	GCMS	1625
111911	BIS(2-CHLOROETHOXY)METHANE	GCMS	1625
111444	BIS(2-CHLOROETHYL) ETHER	GCMS	1625
108601	BIS(2-CHLOROISOPROPYL) ETHER	GCMS	1625
117817	BIS(2-ETHYLHEXYL) PHTHALATE	GCMS	1625
85687	BUTYL BENZYL PHTHALATE	GCMS	1625
86748	CARBAZOLE	GCMS	1625
218019	CHRYSENE	GCMS	1625
7700176	CROTOXYPHOS	GCMS	1625
84742	DI-N-BUTYL PHTHALATE	GCMS	1625
117840	DI-N-OCTYL PHTHALATE	GCMS	1625
621647	DI-N-PROPYLNITROSAMINE	GCMS	1625
53703	DIBENZO(A,H)ANTHRACENE	GCMS	1625
132649	DIBENZOFURAN	GCMS	1625
132650	DIBENZOTHIOPHENE	GCMS	1625

Table A-2 (Continued)

CAS Number	Common Name	Technique	Method
84662	DIETHYL PHTHALATE	GCMS	1625
131113	DIMETHYL PHTHALATE	GCMS	1625
67710	DIMETHYL SULFONE	GCMS	1625
101848	DIPHENYL ETHER	GCMS	1625
122394	DIPHENYLAMINE	GCMS	1625
882337	DIPHENYLDISULFIDE	GCMS	1625
76017	ETHANE, PENTACHLORO-	GCMS	1625
62500	ETHYL METHANESULFONATE	GCMS	1625
96457	ETHYLENETHIOUREA	GCMS	1625
206440	FLUORANTHENE	GCMS	1625
86737	FLUORENE	GCMS	1625
118741	HEXACHLOROBENZENE	GCMS	1625
87683	HEXACHLOROBUTADIENE	GCMS	1625
77474	HEXACHLOROCYCLOPENTADIENE	GCMS	1625
67721	HEXACHLOROETHANE	GCMS	1625
1888717	HEXACHLOROPROPENE	GCMS	1625
142621	HEXANOIC ACID	GCMS	1625
193395	INDENO(1,2,3-CD)PYRENE	GCMS	1625
78591	ISOPHORONE	GCMS	1625
120581	ISOSAFROLE	GCMS	1625
475207	LONGIFOLENE	GCMS	1625
569642	MALACHITE GREEN	GCMS	1625
72333	MESTRANOL	GCMS	1625
91805	METHAPYRILENE	GCMS	1625
66273	METHYL METHANESULFONATE	GCMS	1625
124185	N-DECANE	GCMS	1625
629970	N-DOCOSANE	GCMS	1625
112043	N-DODECANE	GCMS	1625
112958	N-EICOSANE	GCMS	1625
630013	N-HEXACOSANE	GCMS	1625
544763	N-HEXADECANE	GCMS	1625
924163	N-NITROSODI-N-BUTYLAMINE	GCMS	1625
55185	N-NITROSODIETHYLAMINE	GCMS	1625
62759	N-NITROSODIMETHYLAMINE	GCMS	1625
86306	N-NITROSODIPHENYLAMINE	GCMS	1625
10595956	N-NITROSOMETHYLETHYLAMINE	GCMS	1625
614006	N-NITROSOMETHYLPHENYLAMINE	GCMS	1625
59892	N-NITROSOMORPHOLINE	GCMS	1625
100754	N-NITROSOPIPERIDINE	GCMS	1625

Table A-2 (Continued)

CAS Number	Common Name	Technique	Method
630024	N-OCTACOSANE	GCMS	1625
593453	N-OCTADECANE	GCMS	1625
646311	N-TETRACOSANE	GCMS	1625
629594	N-TETRADECANE	GCMS	1625
638686	N-TRIACONTANE	GCMS	1625
68122	N,N-DIMETHYLFORMAMIDE	GCMS	1625
91203	NAPHTHALENE	GCMS	1625
98953	NITROBENZENE	GCMS	1625
90040	O-ANISIDINE	GCMS	1625
95487	O-CRESOL	GCMS	1625
95534	O-TOLUIDINE	GCMS	1625
95794	O-TOLUIDINE, 5-CHLORO-	GCMS	1625
106478	P-CHLOROANILINE	GCMS	1625
106445	P-CRESOL	GCMS	1625
99876	P-CYMENE	GCMS	1625
60117	P-DIMETHYLAMINOAZOBENZENE	GCMS	1625
100016	P-NITROANILINE	GCMS	1625
608935	PENTACHLOROBENZENE	GCMS	1625
87865	PENTACHLOROPHENOL	GCMS	1625
700129	PENTAMETHYLBENZENE	GCMS	1625
198550	PERYLENE	GCMS	1625
62442	PHENACETIN	GCMS	1625
85018	PHENANTHRENE	GCMS	1625
108952	PHENOL	GCMS	1625
534521	PHENOL, 2-METHYL-4,6-DINITRO-	GCMS	1625
92842	PHENOTHIAZINE	GCMS	1625
23950585	PRONAMIDE	GCMS	1625
129000	PYRENE	GCMS	1625
110861	PYRIDINE	GCMS	1625
108462	RESORCINOL	GCMS	1625
94597	SAFROLE	GCMS	1625
7683649	SQUALENE	GCMS	1625
100425	STYRENE	GCMS	1625
95158	THIANAPHTHENE	GCMS	1625
62555	THIOACETAMIDE	GCMS	1625
492228	THIOXANTHE-9-ONE	GCMS	1625
95807	TOLUENE, 2,4-DIAMINO-	GCMS	1625
217594	TRIPHENYLENE	GCMS	1625
20324338	TRIPROPYLENEGLYCOL METHYL ETHER	GCMS	1625

Table A-2 (Continued)

CAS Number	Common Name	Technique	Method
694804	1-BROMO-2-CHLOROBENZENE	GCMS	1625
108372	1-BROMO-3-CHLOROBENZENE	GCMS	1625
121733	1-CHLORO-3-NITROBENZENE	GCMS	1625
1730376	1-METHYLFLUORENE	GCMS	1625
832699	1-METHYLPHENANTHRENE	GCMS	1625
134327	1-NAPHTHYLAMINE	GCMS	1625
605027	1-PHENYLNAPHTHALENE	GCMS	1625
96128	1,2-DIBROMO-3-CHLOROPROPANE	GCMS	1625
95501	1,2-DICHLOROBENZENE	GCMS	1625
122667	1,2-DIPHENYLHYDRAZINE	GCMS	1625
87616	1,2,3-TRICHLOROBENZENE	GCMS	1625
634366	1,2,3-TRIMETHOXYBENZENE	GCMS	1625
120821	1,2,4-TRICHLOROBENZENE	GCMS	1625
95943	1,2,4,5-TETRACHLOROBENZENE	GCMS	1625
1464535	1,2,3,4-DIEPOXYBUTANE	GCMS	1625
96231	1,3-DICHLORO-2-PROPANOL	GCMS	1625
541731	1,3-DICHLOROBENZENE	GCMS	1625
291214	1,3,5-TRITHIANE	GCMS	1625
106467	1,4-DICHLOROBENZENE	GCMS	1625
100254	1,4-DINITROBENZENE	GCMS	1625
130154	1,4-NAPHTHOQUINONE	GCMS	1625
2243621	1,5-NAPHTHALENEDIAMINE	GCMS	1625
615225	2-(METHYLTHIO)BENZOTHIAZOLE	GCMS	1625
91587	2-CHLORONAPHTHALENE	GCMS	1625
95578	2-CHLOROPHENOL	GCMS	1625
2027170	2-ISOPROPYLNAPHTALENE	GCMS	1625
120752	2-METHYLBENZOTHIOAZOLE	GCMS	1625
91576	2-METHYLNAPHTHALENE	GCMS	1625
88744	2-NITROANILINE	GCMS	1625
88755	2-NITROPHENOL	GCMS	1625
612942	2-PHENYLNAPHTALENE	GCMS	1625
109068	2-PICOLINE	GCMS	1625
243174	2,3-BENZOFLUORENE	GCMS	1625
608275	2,3-DICHLOROANILINE	GCMS	1625
3209221	2,3-DICHLORONITROBENZENE	GCMS	1625
58902	2,3,4,6-TETRACHLOROPHENOL	GCMS	1625
933755	2,3,6-TRICHLOROPHENOL	GCMS	1625
120832	2,4-DICHLOROPHENOL	GCMS	1625
105679	2,4-DIMETHYLPHENOL	GCMS	1625

Table A-2 (Continued)

CAS Number	Common Name	Technique	Method
51285	2,4-DINITROPHENOL	GCMS	1625
121142	2,4-DINITROTOLUENE	GCMS	1625
95954	2,4,5-TRICHLOROPHENOL	GCMS	1625
88062	2,4,6-TRICHLOROPHENOL	GCMS	1625
719222	2,6-DI-TER-BUTYL-P-BENZOQUINONE	GCMS	1625
99309	2,6-DICHLORO-4-NITROANILINE	GCMS	1625
87650	2,6-DICHLOROPHENOL	GCMS	1625
606202	2,6-DINITROTOLUENE	GCMS	1625
56495	3-METHYLCHOLANTHRENE	GCMS	1625
99092	3-NITROANILINE	GCMS	1625
91941	3,3'-DICHLOROBENZIDINE	GCMS	1625
119904	3,3'-DIMETHOXYBENZIDINE	GCMS	1625
1576676	3,6-DIMETHYLPHENANTHRENE	GCMS	1625
92671	4-AMINOBIPHENYL	GCMS	1625
101553	4-BROMOPHENYL PHENYL ETHER	GCMS	1625
89634	4-CHLORO-2-NITROANILINE	GCMS	1625
59507	4-CHLORO-3-METHYLPHENOL	GCMS	1625
7005723	4-CHLOROPHENYLPHENYL ETHER	GCMS	1625
100027	4-NITROPHENOL	GCMS	1625
101144	4,4'-METHYLENEBIS(2-CHLOROANILINE)	GCMS	1625
203546	4,5-METHYLENE PHENANTHRENE	GCMS	1625
99558	5-NITRO-O-TOLUIDINE	GCMS	1625
57976	7,12-DIMETHYLBENZ(A)ANTHRACENE	GCMS	1625

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Table A-3

List of Constituents for Analysis - Metal Analytes

CAS Number	Common Name	Technique	Method
7429905	ALUMINUM	ICP	1620
7440360	ANTIMONY	FURNAA	1620
7440382	ARSENIC	FURNAA	1620
7440393	BARIUM	ICP	1620
7440417	BERYLLIUM	ICP	1620
7440428	BORON	ICP	1620
7440439	CADMIUM	ICP	1620
7440702	CALCIUM	ICP	1620
7440473	CHROMIUM	ICP	1620
7440484	COBALT	ICP	1620
7440508	COPPER	ICP	1620
7439896	IRON	ICP	1620
7439921	LEAD	ICP	1620
7439954	MAGNESIUM	ICP	1620
7439965	MANGANESE	ICP	1620
7439976	MERCURY	CVAA	1620
7439987	MOLYBDENUM	ICP	1620
7440020	NICKEL	ICP	1620
7782492	SELENIUM	FURNAA	1620
7440224	SILVER	ICP	1620
7440235	SODIUM	ICP	1620
7440280	THALLIUM	FURNAA	1620
7440315	TIN	ICP	1620
7440326	TITANIUM	ICP	1620
7440622	VANADIUM	ICP	1620
7440655	YTTRIUM	ICP	1620
7440666	ZINC	ICP	1620

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Table A-4

List of Constituents for Analysis - Organo-Phosphorous Pesticide Analytes

CAS Number	Common Name	Technique	Method
2642719	AZINPHOS ETHYL	GC-FPD	1657
86500	AZINPHOS METHYL	GC-FPD	1657
470906	CHLORFEVINPHOS	GC-FPD	1657
2921882	CHLOROPYRIFOS	GC-FPD	1657
56724	COUMAPHOS	GC-FPD	1657
7700176	CROTOXYPHOS	GC-FPD	1657
78488	DEF	GC-FPD	1657
8065483	DEMETON	GC-FPD	1657
8065483A	DEMETON A	GC-FPD	1657
8065483B	DEMETON B	GC-FPD	1657
333415	DIAZINON	GC-FPD	1657
97176	DICHLOFENTHION	GC-FPD	1657
62737	DICHLORVOS	GC-FPD	1657
141662	DICROTOPHOS	GC-FPD	1657
60515	DIMETHOATE	GC-FPD	1657
78342	DIOXATHION	GC-FPD	1657
298044	DISULFOTON	GC-FPD	1657
2104645	EPN	GC-FPD	1657
563122	ETHION	GC-FPD	1657
13194484	ETHOPROP	GC-FPD	1657
52857	FAMPHUR	GC-FPD	1657
115902	FENSULFOTHION	GC-FPD	1657
55389	FENTHION	GC-FPD	1657
680319	HEXAMETHYLPHOSPHORAMIDE	GC-FPD	1657
21609905	LEPTOPHOS	GC-FPD	1657
121755	MALATHION	GC-FPD	1657
150505	MERPHOS	GC-FPD	1657
10265926	METHAMIDOPHOS	GC-FPD	1657
5598130	METHYL CHLORPYRIFOS	GC-FPD	1657
298000	METHYL PARATHION	GC-FPD	1657
953173	METHYL TRITHION	GC-FPD	1657
7786347	MEVINPHOS	GC-FPD	1657
6923224	MONOCROTOPHOS	GC-FPD	1657
300765	NALED	GC-FPD	1657
56382	PARATHION (ETHYL)	GC-FPD	1657
298022	PHORATE	GC-FPD	1657
732116	PHOSMET	GC-FPD	1657
13171216	PHOSPHAMIDON	GC-FPD	1657
297994	PHOSPHAMIDON E	GC-FPD	1657
23783984	PHOSPHAMIDON Z	GC-FPD	1657

Table A-4 (continued)

CAS Number	Common Name	Technique	Method
299843	RONNEL	GC-FPD	1657
3689245	SULFOTEPP	GC-FPD	1657
35400432	SULPROFOS (BOLSTAR)	GC-FPD	1657
107493	TEPP	GC-FPD	1657
13071799	TERBUFOS	GC-FPD	1657
22248799	TETRACHLORVINPHOS	GC-FPD	1657
34643464	TOKUTHION	GC-FPD	1657
52686	TRICHLORFON	GC-FPD	1657
327980	TRICHLORONATE	GC-FPD	1657
78308	TRICRESYLPHOSPHATE	GC-FPD	1657
512561	TRIMETHYLPHOSPHATE	GC-FPD	1657

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Table A-5

List of Constituents for Analysis - Organo-Halide Pesticide Analytes

CAS Number	Common Name	Technique	Method
30560191	ACEPHATE	GC-HSD	1656
50594666	ACIFIUORFEN	GC-HSD	1656
15972608	ALACHLOR	GC-HSD	1656
309002	ALDRIN	GC-HSD	1656
1912249	ATRAZINE	GC-HSD	1656
1861401	BENFLURALIN (BENEFIN)	GC-HSD	1656
319846	α-BHC	GC-HSD	1656
319857	β-BHC	GC-HSD	1656
58899	γ-BHC (LINDANE)	GC-HSD	1656
319868	δ-BHC	GC-HSD	1656
314409	BROMACIL	GC-HSD	1656
1689992	BROMOXYNIL OCTANOATE	GC-HSD	1656
23184669	BUTACHLOR	GC-HSD	1656
2425061	CAPTAFOL	GC-HSD	1656
133062	CAPTAN	GC-HSD	1656
786196	CARBOPHENOTHION (TRITHION)	GC-HSD	1656
57749	CHLORDANE	GC-HSD	1656
5103719	α -CHLORDANE (CIS-CHLORDANE)	GC-HSD	1656
5103742	γ -CHLORDANE (TRANS-CHLORDANE)	GC-HSD	1656
510156	CHLORBENZILATE	GC-HSD	1656
2675776	CHLORONEB (TERRANEB)	GC-HSD	1656
5836102	CHLOROPROPYLATE (ACARALATE)	GC-HSD	1656
1897456	CHLOROTHALONIL	GC-HSD	1656
96128	DBCP (DIBROMOCHLOROPROPANE)	GC-HSD	1656
1861321	DCPA (DACTHAL)	GC-HSD	1656
72548	4,4'-DDD (TDE)	GC-HSD	1656
72559	4,4'-DDE	GC-HSD	1656
50293	4,4'-DDT	GC-HSD	1656
2303164	DIALLATE (AVADEX)	GC-HSD	1656
2303164A	DIALLATE A	GC-HSD	1656
2303164B	DIALLATE B	GC-HSD	1656
117806	DICHLONE	GC-HSD	1656
115322	DICOFOL	GC-HSD	1656
60571	DIELDRIN	GC-HSD	1656
959988	ENDOSULFAN I	GC-HSD	1656
33213659	ENDOSULFAN II	GC-HSD	1656
1031078	ENDOSULFAN SULFATE	GC-HSD	1656
72208	ENDRIN	GC-HSD	1656
7421934	ENDRIN ALDEHYDE	GC-HSD	1656
53494705	ENDRIN KETONE	GC-HSD	1656
55283686	ETHALFLURALIN (SONALAN)	GC-HSD	1656
2593159	ETRIDIAZOLE	GC-HSD	1656

Table A-5 (Continued)

CAS Number	Common Name	Technique	Method
60168889	FENARIMOL (RUBIGAN)	GC-HSD	1656
76448	HEPTACHLOR	GC-HSD	1656
1024573	HEPTACHLOR EPOXIDE	GC-HSD	1656
465736	ISODRIN	GC-HSD	1656
33820530	ISOPROPALIN (PAARLAN)	GC-HSD	1656
143500	KEPONE	GC-HSD	1656
72435	METHOXYCHLOR	GC-HSD	1656
21087649	METRIBUZIN	GC-HSD	1656
2385855	MIREX	GC-HSD	1656
1836755	NITROFEN (TOK)	GC-HSD	1656
27314132	NORFLUORAZON	GC-HSD	1656
12674112	PCB-1016	GC-HSD	1656
11104282	PCB-1221	GC-HSD	1656
11141165	PCB-1232	GC-HSD	1656
53469219	PCB-1242	GC-HSD	1656
12672296	PCB-1248	GC-HSD	1656
11097691	PCB-1254	GC-HSD	1656
11096825	PCB-1260	GC-HSD	1656
82688	PCNB (PENTACHLORONITROBENZENE)	GC-HSD	1656
40487421	PENDAMETHALIN (PROWL)	GC-HSD	1656
61949766	CIS-PERMETHRIN	GC-HSD	1656
61949777	TRANS-PERMETHRIN	GC-HSD	1656
72560	PERTHANE (ETHYLAN)	GC-HSD	1656
1918167	PROPACHLOR	GC-HSD	1656
709988	PROPANIL	GC-HSD	1656
139402	PROPAZINE	GC-HSD	1656
122349	SIMAZINE	GC-HSD	1656
8001501	STROBANE	GC-HSD	1656
5902512	TERBACIL	GC-HSD	1656
5915413	TERBUTHYLAZINE	GC-HSD	1656
8001352	TOXAPHENE	GC-HSD	1656
43121433	TRIADIMEFON (BAYLETON)	GC_HSD	1656
1582098	TRIFLURALIN	GC-HSD	1656

75 ORGANO-HALIDE PESTICIDE ANALYTES

Table A-6

List of Constituents for Analysis - Chlorinated Biphenyls Congeners

There are 209 possible congeners, 12 of which have toxicological significance (i.e., the "toxic" PCBs identified by the World Health Organization). Method 1668A can unambiguously determine 126 of the 209 congeners as separate chromatographic peaks. The remaining 83 congeners do not appear as separate peaks, but elute from the gas chromatograph in groups of 2 to 6 congeners that cannot be completely resolved by the instrumentation. Ten of the 12 "toxic" congeners are resolved, and the remaining two congeners (PCB 156 and PCB 157) elute as a congener pair. (Because PCB 156 and 157 have identical toxicity equivalency factors (TEFs), it is possible to accurately calculate PCB toxic equivalence (TEQ) based on the 12 toxic congeners.)

For reporting purposes, each sample will be associated with 126 results that represent the 126 single PCB congeners, and another 33 results that represent co-eluting congener groups for the remaining 83 congeners, for a total of 159 PCB congener "results." In addition, each sample will be associated with 10 values corresponding to the 10 possible levels of chlorination for the parent biphenyl. Each of these 10 values represents the sum of the concentrations of all of the congeners in a given level of chlorination (i.e., a total of the mon-chlorinated PCBs, a total of the di-chloro PCBs, etc.). Finally, each sample is associated with a grand total PCB value, which represents the sum of the 126 congener results plus the 33 values for the co-eluting congeners. In summary, each analysis will include 170 unique PCB results (126+33+10+1), and 11 of these results represent totals drawn from the first 159 records (126+33).

159 congeners, including the following 12 "toxic" congeners:

Common Name	Technique	Method
3,3'4,4'-TeCB	HRGCMS	1668
3,4,4',5-TeCB	HRGCMS	1668
2,3,3'4,4'-PeCB	HRGCMS	1668
2,3,4,4',5-PeCB	HRGCMS	1668
2,3'4,4',5-PeCB	HRGCMS	1668
2',3,4,4',5-PeCB	HRGCMS	1668
3,3'4,4',5-PeCB	HRGCMS	1668
2,3,3',4,4',5-HxCB	HRGCMS	1668
2,3,3'4,4',5'-HxCB	HRGCMS	1668
2,3',4,4',5,5'-HxCB	HRGCMS	1668
3,3'4,4',5,5'-HxCB	HRGCMS	1668
2,3,3',4,4',5,5'-HpCB	HRGCMS	1668

209 PCB CONGENERS

Table A-7

List of Constituents for Analysis - Dioxin and Furan Analytes

CAS Number	Common Name	Technique	Method
3268879	OCTACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
39001020	OCTACHLORODIBENZOFURAN	HRGCMS	1613
35822469	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXINS	HRGCMS	1613
67562394	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	HRGCMS	1613
39227286	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
70648269	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	HRGCMS	1613
55673897	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	HRGCMS	1613
57653857	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
57117449	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	HRGCMS	1613
40321764	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
57117416	1,2,3,7,8-PENTACHLORODIBENZOFURAN	HRGCMS	1613
19408743	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
72918219	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	HRGCMS	1613
60851345	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	HRGCMS	1613
57117314	2,3,4,7,8-PENTACHLORODIBENZOFURAN	HRGCMS	1613
1746016	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	HRGCMS	1613
51207319	2,3,7,8-TETRACHLORODIBENZOFURAN	HRGCMS	1613

17 DIOXIN ANALYTES

Appendix B

Field Measurement Test Kit Instructions and Calibration Requirements

Appendix B of the Sampling and Analysis Plan for the Holland America Oosterdam can be found in the Cruise Ship Rulemaking Record in Section 6.4.4 Document Control Number 00338.

Appendix C

Sampling Schedule

Pre-Sampling and Sampling Schedules
Holland America Oosterdam

September 10 (Friday)

- Pre-Sampling Team arrives in Seattle.

September 11 (Saturday)
Seattle, 7:00 am to 5:00 pm

- Board Oosterdam.
- Establish ship contacts, emergency procedures, sampling procedures, and manifest requirements.
- Health and safety briefing and lifeboat drill.
- Locate and load ISCOs, flow meters, bottles, trip blank, and pre-sampling equipment/PPE.
- Verify all sampling ports have been installed.
- Locate storage and staging areas; prep and organize these areas.
- Locate/confirm availability of berthing areas for sampling staff.
- Identify and test Internet connection.
- Check bottles for breakage or incomplete shipment.

September 12 (Sunday)
Cruising Inside Passage

- SP-6: Influent to graywater treatment system. Install Controlotron flow meter on influent pipe to vibratory filter. Begin logging data; compare flow measurements with existing flow meter at influent to vibratory filter. Practice downloading data from flow meter. Connect to ISCO, and practice programming.
- SP-8/9: Effluent from graywater treatment system. Install Controlotron meter on the UV effluent pipe. Practice programming ISCO. Compare results to other flow data sources for confirmation of setup.
- Coordinate with ship's crew to determine sampling methodology/schedule for SP-4: Food pulper wastewater characterization, vacuum tank, SP-5: Food pulper wastewater characterization, centrifuge, and SP-15: Combined graywater and blackwater/graywater treatment system waste sludge.
- Complete data sheets.

September 13 (Monday)
Juneau, 1:00 pm to 8:00 pm

- Locate and load sampling equipment.
- Unpack and organize sampling equipment in storage and staging areas. Identify missing or broken equipment.
- Assist laboratory analysis crew member, who will board for the day and set up laboratory space.
- Collect equipment blank and send off with laboratory analysis crew member.
- SP-11: Influent to blackwater/graywater treatment system. Install Controlotron meter on buffer tank outlet piping. Practice programming ISCO.
- SP-13/14: Effluent from blackwater/graywater treatment system. Install Controlotron meter on the UV effluent pipe. Practice programming ISCO. Compare results to other flow data sources for confirmation of setup.
- SP-6: Influent to graywater treatment system. Download and review flow data. Attempt a test composite.
- SP-8/9: Effluent from graywater treatment system. Download and review flow data. Attempt a test composite.
- Complete data sheets.

September 14 (Tuesday)
Cruising Hubbard Glacier

- SP-16: Final combined discharge from graywater and blackwater/graywater treatment systems. Install Controlotron meter on combined final discharge pipe. Practice programming ISCO. Compare results to existing flow meter at this location.
- SP-2: Laundry wastewater characterization. Install Controlotron flow meter on the effluent pipe from the laundry holding tank. Begin logging data; collect data on laundry tank levels for confirmation of setup. Practice downloading data from flow meter. Connect to ISCO, and practice programming.
- SP-11: Influent to blackwater/graywater treatment system. Download and review flow data. Attempt a test composite.
- SP-13/14: Effluent from blackwater/graywater treatment system. Download and review flow data. Attempt a test composite.
- SP-6: Influent to graywater treatment system. Download and review flow data. Attempt another test composite (if needed).
- SP-8/9: Effluent from graywater treatment system. Download and review flow data. Attempt another test composite (if needed).
- Complete data sheets.

September 15 (Wednesday)
Sitka, 7:00 am to 6:00 pm

- SP-3: Galley wastewater characterization. Attempt to install Controlotron flow meter on influent pipe to crew galley grease trap. Begin logging data; collect data on galley wastewater generation for confirmation of setup. Practice downloading data from flow meter. Connect to ISCO, and practice programming.

- SP-16: Final combined discharge from graywater and blackwater/graywater treatment systems. Download and review flow data. Attempt a test composite.

- SP-2: Laundry wastewater characterization. If flow meter installation was successful, download and review flow data and attempt a test composite. If setup was not successful, develop a plan/schedule for collecting tank level data and samples.

- SP-11: Influent to blackwater/graywater treatment system. Download and review flow data. Attempt another test composite (if needed).

- SP-13/14: Effluent from blackwater/graywater treatment system. Download and review flow data. Attempt another test composite (if needed).

- Monitor flow meters and download flow data at SP-6 and SP-8/9.

- Contact Macdonalds Ltd. to discuss logistics for planned sample shipment on Wednesday, September 22.

- Complete data sheets.

September 16 (Thursday)
Ketchikan, 7:00 am to 1:00 pm

- SP-1: Accommodations wastewater characterization. Attempt to install Controlotron flow meter on the effluent pipe from the accommodations holding tank. Begin logging data; collect data on accommodations holding tank levels for confirmation of setup. Practice downloading data from flow meter. Connect to ISCO, and practice programming.

- SP-3: Galley wastewater characterization. If flow meter installation was successful, download and review flow data and attempt a test composite. If setup was not successful, develop a plan/schedule for collecting available flow data and samples.

- SP-16: Final combined discharge from graywater and blackwater/graywater treatment systems. Download and review flow data. Attempt another test composite (if needed).

- SP-2: Laundry wastewater characterization. If flow meter installation was successful, download and review flow data. Attempt another test composite (if needed). If it was not successful, complete planned sampling methodology and schedule for this sampling location.

- Monitor flow meters and download flow data at SP-6, SP-8/9, SP-11, and SP-13/14.

- Contact Mail Boxes Etc. to discuss logistics for planned sample shipment on Thursday, September 23.

- Complete data sheets.

September 17 (Friday)
Victoria, 8:00 pm to midnight

- SP-1: Accommodations wastewater characterization. If flow meter installation was successful, download and review flow data and attempt a test composite. If setup was not successful, develop a plan/schedule for collecting tank level data and samples.
- SP-3: Galley wastewater characterization. If flow meter installation was successful, download and review flow data. Attempt another test composite (if needed). If it was not successful, complete planned sampling methodology and schedule for this sampling location.
- Monitor flow meters and download flow data at SP-6, SP-8/9, SP-11, SP-13/14, SP-16, and SP-2.
- Based on flow data collected, determine appropriate peak/off-peak times for grab samples.
- Complete data sheets.
- Sampling Team arrives in Seattle.

September 18 (Saturday)
Seattle, 7:00 am to 5:00 pm
Sampling Day 1

- Sampling Team and laboratory analysis crew member board ship at 8:00am.
- Collect samples according to Sampling Schedule table for Oosterdam.
- Laboratory analysis crew member analyzes all microbiological grabs.
- Monitor flow meters and download/retrieve flow data and tank level data.
- Conduct field tests after each grab.
- SP-1: Accommodations wastewater characterization. If flow meter installation was successful, download and review flow data. Attempt another test composite (if needed). If it was not successful, complete planned sampling methodology and schedule for this sampling location.
- Complete data sheets.

September 19 (Sunday)
Cruising Inner Passage
Sampling Day 2

- Collect samples according to Sampling Schedule table for Oosterdam.
- Laboratory analysis crew member analyzes all microbiological grabs and Day 1 BOD5 and Settleable Solids samples.
- Prepare all Day 1 samples for shipment from Juneau on Day 3.
- Conduct field tests after each grab.
- Monitor flow meters and download/retrieve flow data and tank level data.
- Complete data sheets.

September 20 (Monday)
Juneau, 1:00 pm to 8:00 pm
Sampling Day 3

- Collect samples according to Sampling Schedule table for Oosterdam
- Laboratory analysis crew member analyzes all microbiological grabs; offload Day 2 BOD5 and Settleable Solids samples for analysis at a contractor's Juneau laboratory.
- Prepare all Day 1 and 2 samples for shipment from Juneau.
- Conduct field tests after each grab.
- Monitor flow meters and download/retrieve flow data and tank level data.
- Complete data sheets.

September 21 (Tuesday)
Cruising Hubbard Glacier
Sampling Day 4

- Collect samples according to Sampling Schedule table for Oosterdam.
- Prepare all Day 3 samples for shipment from Sitka on Day 5.
- Laboratory analysis crew member analyzes all microbiological grabs.
- Conduct field tests after each grab.
- Monitor flow meters and download/retrieve flow data and tank level data.
- Complete data sheets.

September 22 (Wednesday)
Sitka, 7:00 am to 6:00 pm
Sampling Day 5

- Collect samples according to Sampling Schedule table for Oosterdam.
- Prepare and ship all Day 3 and 4 samples for shipment from Sitka via Goldsteak (BOD5 and Settleable Solids) and Federal Express.
- Pack any excess equipment for shipment from Seattle back to the office.
- Laboratory analysis crew member analyzes all microbiological grabs.
- Monitor flow meters and download/retrieve flow data and tank level data.
- Complete data sheets.

September 23 (Thursday)
Ketchikan, 7:00 am to 1:00 pm
Sampling Ends

- Prepare Day 5 samples for shipment via Goldstreak (BOD5 and Settleable Solids) and Federal Express from Ketchikan.

- Pack remaining equipment, including flow meters for shipment via Federal Express from Seattle.

- Laboratory analysis crew member analyzes all microbiological grabs.

- Complete data sheets.

September 24 (Friday)
Victoria, 8:00 pm to midnight

- Pack any additional equipment and prepare for shipment from Seattle.

- Clean sampling area.

September 25 (Saturday)
Seattle, 7:00 am to 5:00 pm

- Remainder of sampling crew disembarks.

- Ship remaining equipment via Federal Express.

Sampling Schedule for Oosterdam (9/18 to 9/23)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	Sunday, 9/19/04	Monday, 9/20/04	Tuesday, 9/21/04	Wednesday, 9/22/04
SP-1 Accommodations Wastewater Characterization	NA	NA	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (2x): Micros Composite: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	NA	NA
SP-2 Laundry Wastewater Characterization	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (2x): Micros Composite: SVOCs Metals BOD Solids Group I Group II D/F Minimum Volume: 10.5 L	NA	NA	NA	NA

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-3 Galley Wastewater Characterization	NA	**Grabs** (4x): Micros, VOCs, HEM/SGT-HEM, Cyanide; (2x) Micros Composite: SVOCs Metals BOD Solids Group I Group II Pest Minimum Volume: 12.5 L	NA	NA	NA
SP-4 Food Pulper Wastewater Characterization, Vacuum Tank	NA	NA	NA	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (2x): Micros Composite: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	NA

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-5 Food Pulper Wastewater Characterization, Centrifuge	NA	NA	NA	NA	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (2x): Micros Composite: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L
SP-6 Influent to Graywater Treatment System	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5
SP-7 Influent to Graywater Treatment System UV Disinfection	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-8 Effluent From Graywater Treatment System	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM plus MS/MSD, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM plus MS/MSD, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L
SP-9 Duplicate of SP-8	**Grabs** (4x): Cyanide plus MS/MSD; (1x): Micros plus micro lab dup. **Composite**: SVOCs plus MS/MSD Minimum Volume: 6 L	**Grabs** (4x): VOCs plus MS/MSD; (1x): Micros plus micro lab dup. **Composite**: SVOCs plus MS/MSD BOD Minimum Volume: 7 L	**Grabs** (4x): Cyanide plus MS/MSD; (1x): Micros plus micro lab dup. **Composite**: Group I plus MS/MSD Metals plus MS/MSD Minimum Volume: 9 L	**Composite:** Group II plus MS/MSD BOD Minimum Volume: 5.5 L	**Composite:** Group II plus MS/MSD Solids Minimum Volume: 5.5 L
SP-10 Incinerator Ash	NA	NA	NA	NA	**Grab** (1x): SVOCs Metals (total only) D/F

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-11 Influent to Blackwater/ Graywater Treatment System	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II PCB Minimum Volume: 10.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Pest Minimum Volume: 12.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L
SP-12 Influent to Blackwater/ Graywater Treatment System UV Disinfection	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros	**Grabs** (3x): Micros

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-13 Effluent from Blackwater/ Graywater Treatment System	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM plus MS/MSD, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L
SP-14 Duplicate of SP-13	**Grabs** (4x): Cyanide plus MS/MSD **Composite**: Metals plus MS/MSD Solids Minimum Volume: 7 L	**Grabs** (4x): VOCs plus MS/MSD **Composite**: SVOCs plus MS/MSD Minimum Volume: 6 L	**Grabs** (1x): Micros plus micro lab dup. **Composite**: Group I plus MS/MSD Metals plus MS/MSD Minimum Volume: 9 L	**Grabs** (4x): VOCs plus MS/MSD; (1x): Micros plus micro lab dup. **Composite:** Group II plus MS/MSD BOD Minimum Volume: 5.5 L	**Grabs** (1x): Micros plus micro lab dup. **Composite:** Group I plus MS/MSD Solids Minimum Volume: 4 L
SP-15 Combined Graywater and Blackwater/ Graywater Treatment System Waste Sludge	NA	NA	NA	**Grab** (1x): VOCs SVOCs Metals (total only) Cyanide Group I Group II Total Volume: 7.5 L	NA

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
SP-16 Final Combined Discharge from Graywater and Blackwater/ Graywater Treatment Systems	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L	**Grabs** (4x): VOCs, HEM/SGT-HEM, Cyanide; (3x): Micros **Composite**: SVOCs Metals BOD Solids Group I Group II Minimum Volume: 8.5 L
SP-17 Source Water	NA	**Grab** (1x): Micros VOCs SVOCs Metals Cyanide BOD Solids Group I Group II Minimum Volume 9.5L	NA	NA	NA
SP-18 Trip Blank	NA	NA	NA	NA	Ship on Day 5
SP-19 Equipment Blank	Perform September 13 **Grab** SVOCs Metals Minimum Volume: 4 L				

Sampling Schedule (8/28 to 9/01) (Continued)

Sample Point	Day 1 (Seattle, 7a-5p)	Day 2 (At Sea)	Day 3 (Juneau, 1p-8p)	Day 4 (At Sea)	Day 5 (Sitka, 7a-6p)
	Saturday, 9/18/04	**Sunday, 9/19/04**	**Monday, 9/20/04**	**Tuesday, 9/21/04**	**Wednesday, 9/22/04**
Shipping Schedule	No shipping	No shipping	Via Fed Ex 9 classicals/metals 7 organics 2 available CN 1 pesticides 1 D/F & PCBs Total: 20 coolers 2 coolers (BOD5 and SS) to contractor via hand delivery	No shipping	Via Fed Ex 11 classicals/metals 4 organics 2 available CN Total: 17 coolers 3 coolers (BOD5 and SS) to contractor via Alaska Goldstreak
					Thursday, 9/23/04 (Ketchikan, 7a-1p) Via Fed Ex 5 classicals/metals 2 organics 1 available CN 1 D/F, ash only Total: 9 coolers 2 coolers (BOD5 and SS) to contractor via Alaska Goldstreak All remaining equipment.